Rhodora

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DAVID PEARCE PENHALLOW.

WALTER DEANE.

(Read before the New England Botanical Club, December 2, 1910.)

IT is my sad duty to record once more the death of one of our number, a man who won marked distinction as a student of fossil plants, Professor David Pearce Penhallow, a non-resident member of The New England Botanical Club since November 6, 1896. For many years connected with McGill University in Montreal, Professor Penhallow has been considered by many rather as a Canadian than otherwise, but this was far from the truth. To the end he was a loyal citizen of the United States to which he returned regularly to cast his vote.

Although unable to be present at our meetings except on rare occasions, he took a keen interest in all our proceedings, was a devoted reader of RHODORA, and we were fortunate in having an article from his pen appear in the September number of our journal for 1909. This article, 'An Account of certain noteworthy features in the habitat of Rhodora,' was suggested the previous summer by an investigation of a peat bog in process of development in Shelburne, New Hampshire, on whose borders grows the shrub Rhodora.

Whoever was privileged to know Professor Penhallow as a warm friend, or to meet him for only a single time, was irresistibly drawn to him by his courteous manner, his fine figure, handsome face, gentle but firm voice, and the charm of his conversation. He was a man of sterling character, firm in his convictions of what was honest and upright and fearless in expressing them, and yet withal there was a gentleness in his nature and disposition that always won friends. His knowledge

was not confined to a single branch of science, but his botanical activities were in many different fields in all of which he worked with a thoroughness always characteristic of everything he did. The extreme versatility of his scientific studies may be shown by a few examples.

In 1882 he published as Series 3, no. 2, of the Houghton Farm Experiment Department, 'Peach Yellows,' a paper dealing with vegetable pathology. In the Ninth Annual Report of the Montreal Horticultural Society, published in 1884, appeared his article 'Notes on the trees and shrubs of northern Japan,' a paper of horticultural importance. In May, 1886, the American Naturalist contained his observations on 'Variation in water in trees and shrubs,' showing the hydration of dead wood and of wood from living trees and shrubs, the latter case illustrated by studies of seventy-six species, a subject within the field of vegetable physiology. In the Canadian Record of Science, vol. ii, no. 2, April, 1886, was published 'Physical Characteristics of the Ainos.' These tribes occupy "Yezo and the Kuriles" and Professor Penhallow says that his experience extended over "four years of intimate acquaintance with these people, hundreds of whom were brought under observation." To this ethnological paper I will add one more dealing with palaeo-botany, 'Notes on the Erian (Devonian) Plants from New York and Pennsylvania,' published in the Proceedings of the United States National Museum, vol. xvi, 1893. This is enough to show the great variety of subjects that occupied his attention and were treated with a masterly hand.

David Pearce Penhallow was born at Kittery Point, Maine, on May 25, 1854, and was graduated at Amherst College, Massachusetts, receiving the degree of Bachelor of Science (B. S.) in 1873. Here he developed a passion for vegetable physiology, but he was not allowed to give himself up to this work, for not long after his graduation he went to Sapporo, Japan, to assist in founding the Imperial College of Agriculture, President William S. Clarke of Amherst being at the head of the party, and William Wheeler, now of Concord, constituting the third member. There Mr. Penhallow was Professor of botany and chemistry from 1876 to 1880, and acting President from 1879 to 1880. He was accompanied during a portion of this time by his wife who was Sarah A. Dunlap of Amherst, and whom he married on May 4, 1876. After finishing his engagement at Sapporo he returned to the United States, and soon after was appointed botanist

to the short-lived Houghton Farm in New York. This position he held during the year 1882 to 1883. Professor George L. Goodale, whom I wish to thank for some facts regarding Professor Penhallow, says, "This experimental farm began its work under the most favorable auspices and presented a capital chance for investigations in plant life. Professor Penhallow did first-class work at this point, but, suddenly, in a spasm of economy, the projector of the enterprise gave it up, and sent him adrift." Professor Goodale offered him the hospitality of the Harvard Botanic Garden and the University Laboratory, and he also had the summer school class in botany.

In 1883 he accepted the position of Professor of Botany at McGill University in Montreal. Here he had general classes in botany, but there was not much opportunity for physiological work. The late Sir John William Dawson, the Canadian geologist and naturalist, and at that time Principal of McGill University, turned him over to palaeo-botany and the little leisure he had was given up to that part of the field. He held his position there for twenty-seven years until his death. The University conferred upon him the degree of Master of Science (M. S.) in 1896, and that of Doctor of Science (D. S.) in 1904. It was during this period, in 1888, that Boston University gave Professor Penhallow the degree of Bachelor of Science (B. S.).

His published works were written mainly during his life at McGill University, and some idea of their extent can be formed from the fact that his publications on botanical subjects alone, chiefly relating to palaeo-botany, comprise about one hundred and fifty titles, while his reputation as a scholar, a director and an organizer is shown in the many honorable positions he held in societies and institutions of note both at home and abroad.

During the past few years he was very active in establishing a Biological Station at St. Andrews, New Brunswick, and to this task he devoted his very best energies and strength. Much of the work came during the vacation period and this in connection with his regular duties was too much for him. His wonderful physique could not endure this strain.

It was early in December, 1909, that he fell ill, but he manfully labored to regain his health which had always been so robust that the strenuous climbs and tramps that many shrink from were a pleasure and exhilaration to him. He went with his wife in late December to South Carolina, and in early spring they returned north to Shel-

burne, New Hampshire, leaving there in July for Kittery Point, Maine. He was gradually regaining strength, and at one time even hoped to resume work in the fall. As the time, however, approached, it was clearly impossible, and he was granted a year's leave of absence. On October 14, Professor and Mrs. Penhallow sailed from Montreal for England, intending to settle in Cornwall where a complete change and rest would, it was confidently believed, restore him to health. His friends little realized that they should never see him again. While still at sea on October 20, five days' sail from Liverpool, he died and, though we all mourn the death of a valued member of our Club and some of us of a warm and cherished friend, yet we can rejoice that his record is one of a life well spent in increasing the world's knowledge of botanical science, and we can be proud that Professor David Pearce Penhallow was connected so long with us.

A NEW SPECIES OF SCIRPUS FROM MASSACHUSETTS AND NEW JERSEY.

M. L. Fernald.

In June, 1910, the writer received from Mr. Witmer Stone of the Academy of Natural Sciences of Philadelphia a *Scirpus* from the New Jersey Pine Barrens, with the following self-explanatory communication:

"Last year at about this time I found a *Scirpus* — just one plant — that recalled *S. atrocinctus* but seemed to differ in several particulars. In spite of numerous efforts I failed to find any more until now, when I have just found about an acre of it at another locality (near Williamstown Junction on the Atlantic City R. R.). I am sending you some fresh specimens for your opinion but fear they will be dried out when they reach you. I can, however, send herbarium specimens later if you desire them. *S. atrocinctus* we get only up on top of the Alleghanies and the Pocono Mountains and it blooms *much* later than this. I should thank you very much for your opinion of this Pine Barren plant. If it *is atrocinctus* it is a very remarkable occurrence. I might say that the black bands were distinctly glutinous on the growing plant."

As feared by Mr. Stone the specimens, when they reached Cambridge, were dried out so that a close study of the plant, which seemed like an extreme variant of *Scirpus atrocinctus*, was deferred until the receipt of well pressed and characteristic material in the autumn. A preliminary examination showed the Pine Barren plant to have several differences from *S. atrocinctus*, but with only a single collection at hand the writer was inclined to regard it as a pronounced southern variety of that boreal species. Upon further communication with Mr. Stone it was learned that Mr. Bayard Long of the Philadelphia Academy had made a thorough study of the plant and would soon forward his results to Cambridge.

In the mean time, in sorting the *Cyperaceae* contained in the herbarium of Mr. Charles E. Faxon, recently presented to the Gray Herbarium, the writer's attention was arrested by one specimen so strongly suggesting the New Jersey material that it was examined in detail and found to have the same large stature, glutinous black bases to the involucral leaves, long pedicels, spikelets, scales and anthers, and the distinctive dark-reddish achenes of the Pine Barren plant. Mr. Faxon's plant was collected in Boston in the early days of his botanizing and, though the label contained no more definite data, it was sufficient to stimulate a fruitful inquiry. Accordingly, when that indefatigable explorer of the Charles River system, Mr. Fayette F. Forbes, called next day at the Gray Herbarium, he was shown the new plant and in the evening telephoned: "The new *Scirpus* grows on the Charles River meadows at Dedham, on our Brookline water-works land. I think it is abundant there; at least I have always collected it there as *S. atrocinctus*." The next evening, at the December meeting of the New England Botanical Club, the writer, now further reinforced by flowering and fruiting sheets from Mr. Forbes which showed beautifully all the characteristics of the Stone and the Faxon specimens, exhibited the plant as a new species likely to be found elsewhere in southern New England.

In a few days came a very valuable detailed letter from Mr. Long emphasizing the specific claims of the plant and followed by a suite of specimens from the Williamstown Junction station and from Andrews, on the Great Egg Harbor River. These were perfectly characteristic and renewed the already well grounded conviction that we were dealing with a very distinct but undescribed Wool Grass. As indicated by the notes prepared by Mr. Long during the winter of 1909–10, he had already worked out the specific characters of the

plant and its relation to the more northern *S. atrocinctus;* and, since Mr. Long has on other occasions shown keen discrimination in his study of the *Cyperaceae,* it is a pleasure permanently to associate his name with the new

SCIRPUS **Longii** n. sp. Planta robusta; culmis 9–14 dm. altis ad nodos lucidis; foliis viridibus vel glaucescentibus 3–8 mm. latis marginibus carinulaque serrulatis, basilaribus copiosis confertis basi plus minusve nodulosis, caulinis remotis; cyma umbelliformi irregulariter supra decomposita saepissime opulenta 1–1.8 (rare 3) dm. alta, radiis scaberrimis, longioribus 2–6 erectis, brevioribus numerosis patentis vel arcuatis; involucro 2–3-phyllo, phyllis umbella brevioribus vel eam subaequantibus basi nigrescentibus glutinosisque; involucellis nigrescentibus; spiculis ellipsoideis obtusis 4–8 demum 6–10 mm. longis, lateralibus longe pedicellatis; squamis nigrescentibus carinato-convexis oblongis obtusis 2–3 mm. longis; setis albescentibus subtilissimis tardius longe exsertis crispo-flexuosis glabris; stylo exserto pertenui longe trifido, ramis 1–1.5 mm. longis; antheris linearibus 1–2 (rare 2.5) mm. longis; achenio ellipsoideo-obovoideo trigono circa 0.5 mm. longo castaneo vel badio.

Plant robust: culms 9–14 dm. high, lustrous at the nodes: leaves green or slightly glaucous, 3–8 mm. wide, serrulate along the margins and the narrow keel; the basal numerous and crowded, more or less nodulose toward the base; the cauline remote: cyme umbelliform, irregularly decompound, usually very full, 1–1.8 (rarely 3) dm. high; rays scabridulous; the longer 2–6, erect; the shorter numerous, spreading or curved: involucre of 2–3 leaves; these shorter than or about equaling the umbel, blackish and glutinous at base: involucels blackish: spikelets ellipsoid, obtuse, 4–8, becoming 6–10, mm. long; the lateral long-pediceled: scales blackish, carinate-convex, oblong, obtuse, 2–3 mm. long: bristles whitish, extremely slender, finally long-exserted, crisp-flexuose, glabrous: style exserted, deeply trifid, the branches 1–1.5 mm. long: anthers linear, 1–2 (rarely 2.5) mm. long: achene ellipsoid-obovoid, trigonous, about 0.5 mm. long, chestnut- or reddish-brown.— Meadows, swamps and fresh marshes, often in shallow water, Norfolk County, Massachusetts, and Burlington and Camden Counties, New Jersey. TYPE: northeast of Andrews, along Great Egg Harbor River, Camden County, New Jersey, June 18, 1910, *Bayard Long,* no. 4014 in Gray Herb. (duplicate in Herb. Acad. Phila.). Other material studied from MASSACHUSETTS: Boston, *C. E. Faxon;* swamp, Chamberlain lot, Dedham, June 3, 1900 (fl.), *F. F. Forbes;* damp ground, Charles River Meadows, Dedham, June 26, 1908 (old fruit), *F. F. Forbes.* NEW JERSEY: edge of the Pine Barrens, growing in water, Sicklerville (= Andrews of Long's label), June 18, 1910, *Witmer Stone;* Andrews, June 18, 1910, *B. Long,* no 4008*a* (form with condensed inflorescence); southwest of Williamstown Junction, June 18, 1910, *W. Stone, B. Long,* no. 4039.

Scirpus Longii is quickly distinguished from all its allies by its reddish brown or castaneous achenes, all the other species — *S. cyperinus* (L.) Kunth, *S. Eriophorum* Michx., *S. pedicellatus* Fernald, and *S. atrocinctus* Fernald — having whitish or cream-colored, at most buff, achenes. From *S. atrocinctus*, which it suggests in its blackish-based involucre, and blackish involucels and scales, it is further distinguished by the glutinous base of the involucre; the longer usually blacker scales (those of *S. atrocinctus* being 1.5–2 mm. long); the longer often paler bristles which, as expressed by Mr. Long, give the inflorescence a "shaggier" appearance; the longer filaments; and the longer anthers, 1–2, rarely 2.5 mm. long (those of *S. atrocinctus* being 0.3–0.5 mm. long); and by the style-branches 1–1.5 mm. long (in *S. atrocinctus* 0.5–0.75 mm. long). *S. Longii* is also a more robust plant, with a larger inflorescence and longer spikelets than are ordinarily seen in *S. atrocinctus*, though in these characters it is approached by the somewhat obscure *S. atrocinctus*, var. *grandis* Fernald. As stated by Messrs. Long and Stone *S. Longii* matures somewhat earlier than *S. atrocinctus*, the New Jersey material of the former having mature achenes on June 18 (and presumably earlier); while *S. atrocinctus* at its southernmost stations, on the mountains of Pennsylvania, is considerably later. In eastern Massachusetts, this difference is also well shown, Mr. Forbes's material of *S. Longii* collected on June 26 having the scales about half gone; while *S. atrocinctus* in the same state of development is collected in Middlesex County from July 15–20.

The following extract from a letter from Mr. Long will be of interest to students of the New Jersey flora.

"The most abundant general locality known to us is that from which Mr. Stone sent you material. I think he probably called it Sicklerville [Camden Co., N. J.]. On my printed labels it (or rather the *two* stations) are called Andrews. We collected the *Scirpus* from two large stations n. e. of Andrews, along the Atlantic City R. R. (Williamstown Br.). I also have material from a third bog s. w. of Williamstown Junc., along the same railroad and in the same region as the other two..... In all these stations fruiting plants were extremely abundant, covering the bogs solidly over large areas to the exclusion of other species. But in our two other localities, though stools of apparently the same plant were common, only a single fruiting culm was found at each. Probably this was due merely to seasonal variation in abundance of flowering. The one specimen is *Stone* 11594, with the label reading: 'Bog along Wading River midway between

Jones' Mill and Speedwell,' with the date July 9, 1909. The other, my own 4273 from Winslow Junc., south along A. C. R. R., on Pennypot Stream (branch of Great Egg Harbor River), June 23, 1910. This gives stations a little more than twenty miles apart, and on two of the larger rivers of N. J. All the localities are distinctly pine-barren. Probably our plant is another peculiar pine-barren form."

"The habitat is quite characteristic. All five stations are similar. It might be called an open pine-barren marsh, scarcely 'bog.' It is the peculiar open area in the pines, supporting commonly only herbaceous vegetation and surrounded by thickets and woods, that occurs mostly along or in the vicinity of the bigger streams. It is not characteristically sphagnous and the vegetation is mostly rank. In spring it is generally quite flooded, but dries out during the summer. The *Scirpus* at Andrews was in a foot, or probably more, of water."

One of the most interesting points in regard to this new *Scirpus* is, that by the Philadelphia botanists it is considered a very typical member of the Pine Barren flora, being confined in their region to a small area of Pine Barren country; and that it is as yet unknown elsewhere except along the Charles River in eastern Massachusetts. The latter region, with the adjacent valleys of the Neponset, Concord, Mystic, and other small rivers, marks nearly or quite the northeastern limit of many plants, local with us but by no means so rare in New Jersey,— *Lilium superbum, Spiranthes Beckii, Sagina decumbens, Draba caroliniana, Cassia Chamaecrista, Crotalaria sagittalis, Polygala Nuttallii, Ilex glabra, Rotala ramosior, Ludvigia sphaerocarpa, Proserpinaca pectinata, Hydrocotyle umbellata, Cuscuta arvensis, C. compacta, Lycopus rubellus, Eupatorium rotundifolium, E. aromaticum, Aster spectabilis, Coreopsis rosea,* etc., etc.— and most of these species are found at scattered (or sometimes numerous) stations, chiefly on the Cretaceous or Tertiary sands and clays, in southern New England, on Long Island or on Staten Island. It is, then, reasonable to suppose that *Scirpus Longii* is to be classed with them as a member of the Pine Barren flora which extends, in somewhat reduced abundance, well beyond the southeastern Coastal Plain into the more sterile districts of coastwise New England.

GRAY HERBARIUM.

THE SUBTERRANEAN ORGANS OF CINNA ARUNDINACEA.

Agnes Chase.

(Plate 85.)

In October of 1910, Mr. Thomas L. Cooper of Decatur, Georgia, sent to the Department of Agriculture a box containing clusters of moniliform underground organs with young plants attached by thread-like rootstocks. These were identified as belonging to some grass, the "bulbs" being much swollen and greatly shortened internodes, the constricted portion being the node, but we knew of no grass having such an underground habit. When shown the specimens on his return from Mexico Prof. Hitchcock suggested *Cinna arundinacea* L. as the species producing the curious organs. Herbarium specimens of this species showed many of the culms to have slightly swollen bases.

Late in November a colony of Cinna in Virginia near the Potomac River was visited and specimens secured with clustered culms, each with a swollen corm-like base, as in *Panicum bulbosum,* and, less conspicuously, in several species of Melica. These swollen bases consisted of one to three (mostly one) internodes, constricted at the node above and below. No moniliform organs were found, but the soil was a heavy clay and it is possible the delicate connecting runners were broken, nor was the colony a large one. The specimens secured, however, served to identify the species with those sent from Georgia. A second supply of the underground organs attached to more developed plants was kindly sent by Mr. Cooper in December. The soil surrounding them was loose and sandy which may account either for the great development of these organs or for their being obtained attached to the plants.

These may be regarded as corms, constricted at the joints. They consist of two to five joints, 5 to 10 mm. in the greatest diameter, and produce rootlets and rootstocks or runners from the nodes. It is not certain how these moniliform corms are formed but they would seem to be the bases of old culms from which the aerial portion has entirely disappeared, since each is tipped by a very hard remnant of apparently an unswollen joint. Sometimes two or three of these moniliform corms are united in a cluster by very short rootstocks.

In cross section these are shown to have a loosely cellular structure, consisting of thin-walled parenchyma, with a few slender, scarcely lignified vascular bundles interspersed. Mr. C. S. Hudson examined these corms and states that they contain no starch. We have not as yet obtained a sufficient quantity to enable him to determine the chemical nature of the cell contents.

The connecting rootstocks or runners are 3 to 10 or 15 cm. long, about 1 mm. thick, obscurely angled, with irregular internodes, and sparingly branching or simple. The thin scales are often reduced to shreds.

The illustration shows one of the moniliform corms with runners connecting it to young plants. Two very young buds may be seen at the nodes and a third short runner with a slightly swollen internode at the end.

The habit here shown is unlike that of any grass so far as we know, *Panicum bulbosum* H. B. K. most nearly approximating it. At first sight these moniliform corms suggest some pathological condition or that the swellings may be occupied by nematodes but a dozen or more of these corms were dissected without finding either worms or diseased tissue.

It would be greatly appreciated if local botanists will examine colonies of either species of Cinna for these subterranean organs and send specimens fresh if possible to the writer at the Department of Agriculture.

Bureau of Plant Industry, Washington, D. C.

ERUCASTRUM POLLICHII ADVENTIVE IN AMERICA.

B. L. Robinson.

The difficulty which has been experienced in ascertaining the precise dates and places at which some European plants, such as *Lactuca Scariola* L., *Sisymbrium altissimum* L., *Brassica juncea* (L.) Cosson., etc., now widely distributed as weeds in America, first reached our continent, suggests the desirability of putting promptly on record the appearance of such related species as may be discovered getting a foothold upon American soil, for these also may in future become equally important elements in our flora.

Some five years ago Mr. William Finger sent to the Gray Herbarium for identification a *Sisymbrium*-like crucifer, which he had collected, 18 October, 1903, along the tracks of a suburban electric line, just beyond the city-limits of Milwaukee. On comparison with European specimens in the Gray Herbarium the plant was determined by the writer as *Diplotaxis bracteata* Gren. & Godr. At the time there appeared to be no record of any other American occurrence of this species, and its single appearance at Milwaukee, a manufacturing and shipping center, seemed too casual to warrant published record.

Some weeks ago Miss Martha Louise Loomis of Sherborn, Massachusetts, sent to the Gray Herbarium for determination another specimen of the same species. It was one of two individuals, which she had discovered and collected in gravelly soil beside the railroad at Sherborn, 4 September, 1910. This second station, at a great distance from the first, suggests that the species is likely to turn up elsewhere in America, possibly to spread and become established in the manner of its near relatives *Diplotaxis muralis* (L.) DC. and *D. tenuifolia* (L.) DC. Though the plant is not yet so firmly fixed as to justify its inclusion in our manuals, there seem to be grounds for putting its American occurrence on record and assembling for the convenience of local botanists its rather extended synonymy. From the latter it will be seen that recent and excellent European authorities are inclined to recognize the validity of the genus *Erucastrum* and maintain it as a convenient disposition for a dubious group of plants which, though in most respects similar to *Diplotaxis*, lack the double row of seeds characteristic of that genus. This view being accepted and the international rules of nomenclature applied, the species may be recorded as follows:

Erucastrum Pollichii Schimp. & Spenn. Fl. Frib. iii. 946 (1829); Coste, Fl. Fr. i. 80 (1901); Garcke, Fl. Deutschl. ed. 20, 345, f. 1064 (1908); Schinz & Keller, Fl. d. Schw. ed. 3, 237 (1909). *Sisymbrium Erucastrum* Poll. Hist. Pl. Palat. ii. 284 (1777). *Brassica Erucastrum*, *β ochroleuca* Gaud. Fl. Helv. iv. 381 (1829). *E. inodorum* Reichenb. Fl. Excurs. 693 (1830), and Ic. Fl. Germ. ii. t. 89, f. 4428 (1837–8). *Sisymbrium hirtum* Host. Fl. Aust. ii. 261 (1831). *Brassica ochroleuca* Soy.-Will. Ann. Sci. Nat. ser. 2, ii. 116 (1834). *Sisymbrium gallicum* Schleich. ex Soy.-Will. l. c., in synon. *Diplotaxis bracteata* Gren. & Godr. Fl. Fr. i. 81 (1847); Rouy & Fouc. Fl. Fr. ii. 44 (1895). *Brassica obtusangula*, var. *β Pollichii* Archang. Comp. Fl. Ital. 45 (1882), and ed. 2, 267 (1894). *Erucastrum bracteatum* St. Lag. in Cariot, Etude d. Fl. ed. 8, ii. 54 (1889).— Annual, erect or ascending,

2–4 dm. high, with habit somewhat as in *Sisymbrium altissimum*; stem retrorsely pubescent, the hairs being simple; leaves oblong in general outline, deeply pinnatifid to decidedly bipinnatifid, the lobes rounded, the sinuses broad and usually obtuse or truncate; racemes at length elongated, loose, the pedicels slender, ascending or so widely spreading as to be nearly horizontal, in fruit 6–10 mm. long, the lower ones subtended by distinct (though much reduced) leaves or leaflike bracts; flowers of medium size; petals pale yellow, 5 mm. in length; pods linear, subterete, 2.5–3.5 cm. long, 1–2 mm. in thickness, tipped with a slender style about 3 mm. long; seeds essentially in a single row in each cell.— Widely distributed in Central and Western Europe; adventive along railways, Milwaukee, Wisconsin, *Wm. Finger*, and Sherborn, Massachusetts, *Miss M. L. Loomis.*

Little difficulty should be experienced in recognizing this species, for its characteristic bracts, though not specially conspicuous, are readily seen and form a feature unusual in cruciferous plants.

Gray Herbarium.

POPULUS VIRGINIANA AND P. ANGULATA.

H. H. Bartlett.

In American botanical works it is customary to include in the synonymy of *Populus deltoides* several names which are maintained in Europe for trees of marked specific characters. Thus, Schneider[1] distinguishes three species, *Populus deltoides, P. monilifera* and *P. angulata* in place of the *P. deltoides* of our manuals. In his Elysium Marianum, Mr. Tidestrom[2] maintains the first and second of these three as distinct (under the names *Aigeiros deltoides* and *A. virginiana*) but the third is not recognized in any current American work. Last October the writer found *Populus virginiana* and *P. angulata* growing abundantly on both the South Carolina and Georgia sides of the Savannah River, at Augusta. They were so clearly different species that specimens were collected for identification by Mr. Tidestrom, who is now studying the poplars.

[1] Illustriertes Handbuch der Laubholzkunde, i, pp. 7–9 (1904).
[2] Elysium Marianum, iii, part 13, pp. 16–17 (1910).

The best account of *Populus angulata* is that of Michaux f.[1] According to his Histoire des Arbres this tree occurs from lower Virginia through the Carolinas to Georgia, from the mouth of the Mississippi to the Missouri, and up the latter river a distance of a hundred miles. It is characteristic of the muddy banks of streams which are subject to overflow.

In the region of the lower Mississippi, *Populus angulata* is associated with a similar and very closely related tree which Michaux f. described under the name *P. canadensis,* although it seems not to be the same as the *P. canadensis* of authors earlier than he. *Populus angulata,* the Carolina poplar, and the *P. canadensis* of Michaux f., the cottonwood of the middle West, differ from *P. deltoides* and *P. virginiana* in having remarkable cork wings on the twigs and younger branches. These are arranged in a definite geometrical pattern; — at the insertion of each petiole one wing runs directly downward, and two others, which lie parallel to the first, on either side of it, form an arch with the petiole at the apex. Above each petiole (or bud, or twig, as the case may be), a cork wing turns obliquely aside and ends abruptly. The wings persist on the branches and trunk for several years, until they are obliterated by the fissuring of the bark. Michaux states that his *P. canadensis* is rare in the Atlantic states, most common on the Mississippi, Arkansas and Missouri Rivers and their affluents. He mentions having seen the tree in the East along the Genesee River, in New York (specimens more than a meter in diameter), in certain parts of Virginia (localities not specified), and notably on many islands of the Ohio. Michaux says that its ability to withstand intense cold proves its distinctness from *P. angulata,*— a tree so tender as to be damaged by frost even in the climate of Paris. Aside from the fact that the trees have an entirely different aspect, he says that they can easily be told by their buds; those of *Populus angulata* are short, very green, and not aromatic-resinous, as are those of *P. canadensis.* Both plants deserve the attention of botanists.

The trees of *Populus angulata* at Augusta have leaves which are several times as large as those of *P. virginiana,*— another character which confirms the distinctness of the two. Even *P. virginiana* itself, however, is so little known to our botanists that a new piece of evidence that it is distinct from *P. deltoides* will be of interest. Mr. M. A. Carlton,[2] in his studies of the rusts of willow and cottonwood,

[1] Histoire des Arbres, iii. pp. 302–305 (1813.)

[2] Bull. 63 Bur. Plant Industry, U. S. Dept. Agric., p. 19 (1904).

found that "the cottonwood most common in Washington, known as the South Carolina poplar, could not be infected by the uredo form [of *Melampsora sp.*] from the common Western cottonwood, although these two poplars are classed by some as being the same species. Moreover, the rust does not occur in nature on the South Carolina poplar, but is very abundant on the Western cottonwood, and even occurs in Washington on the few individual trees of that type growing in the city." The cottonwood most common in Washington, "known as the South Carolina poplar," is *P. deltoides*. The few trees of the other, called by Mr. Carleton "the Western cottonwood" are the same individuals upon which Mr. Tidestrom based his report of *P. virginiana* "in cultivation."

Doubtless our poplars hybridize extensively. This fact renders their study difficult, especially if herbarium material only is dealt with. Botanists who are favorably situated to do so, would, I am sure, confer a great favor upon Mr. Tidestrom by communicating to him poplar specimens and notes concerning them.

Bethesda, Maryland.

Notes on Botrychium from Tennessee.— The occasion of these notes on the Genus *Botrychium* was the finding of a peculiar teratological specimen of *obliquum* Muhl. Upon the sterile frond there are several pinnae which bear groups of well developed sporangia. In every case in which there are several sporangia together a definite rhachis connects them. This rhachis is composed of a portion of the frond which is slit out of the leafy tissue. A line of tissue of lighter green color than the rest, runs out to this rhachis. The sporangia are perhaps a little smaller than the average of the sporangia that are borne on the fertile frond, and the spores are between four and five percent smaller than the normal. The viability of the spores was not tested, but in appearance they were in no appreciable way different from the normal. There was only the one plant of the species found in the locality, which was not far from Knoxville.

This species does not seem to be very common in the parts of East Tennessee which have been examined by the writer, and there are only three specimens of the plant from the entire state in the university herbarium. Two of these are from Middle Tennessee and the other from West Tennessee. The writer has collected it from only one other

place in this section of the state in addition to the one described above, and in both of these localities it was found very sparingly.

The only other species of *Botrychium* from Tennessee represented in the herbarium is *B. virginianum* (L.) Sw. There are specimens from each of the grand divisions of the state, and the writer has gathered it near Knoxville. The plant now classified as *B. obliquum* var. *dissectum* (Spreng.) Clute is reported by Gattinger in his Flora of Tennessee as occurring with these two, but there are no specimens of this variety in his collection which forms a part of the university herbarium.— ERNEST SHAW REYNOLDS, University of Tennessee, Knoxville, Tennessee.

AN IMPORTANT PUBLICATION ON LICHENS.— New England botanists who would like to have some knowledge of our lichens, but who have been prevented by lack of literature will welcome the publication of Prof. Bruce Fink's "Lichens of Minnesota."[1] The work consists of a general introductory account of the structure and reproduction of lichens, followed by a descriptive catalogue, furnished with copious keys, and illustrated with photographs of unusual excellence. Each species is described at some length, and notes as to habitat and geographical range are added. It should be understood, however, that this is not a popular handbook, doing for the lichens what Dr. Grout's serviceable "Mosses with a Hand-Lens" does so well for that group. Prof. Fink has not intended to prepare a popular work, and it is doubtful if such a book would be satisfactory, since the classification of lichens must necessarily be based upon microscopic characters. Unless he has access to an herbarium, the path of the beginner in the study of lichens is not an easy one, at best, but with a microscope at one's disposal, with the patience which all scientific work requires, and with Prof. Fink's book, one is better equipped than has ever before been the case. Of the 439 species and varieties found in Minnesota, over 300 occur also in New England, and while there are some of our familiar New England lichens which do not extend so far west as Minnesota, the work is the most convenient manual available for students throughout the northeastern states. For the specialist this publication is of great significance, as it represents the culmination of fourteen years of careful work, with the matured views of Prof. Fink concerning the considerable number of species which he treats.— L. W. RIDDLE, Wellesley College.

[1] Fink, Bruce. The Lichens of Minnesota. Contributions from the U. S. National Herbarium, vol. 14, part 1, pp. 1–269, with 51 plates and 18 text-figures. Published by the Smithsonian Institution, Washington, D. C., June 1, 1910. A few copies may be obtained from the Superintendent of Public Documents, Government Printing Office, Washington, D. C., at fifty cents each.

A New Textbook of Botany.[1]— The need of a book such as that of Messrs. Coulter, Barnes and Cowles has long been evident and the uniformly high standard maintained throughout the volume will ensure a cordial welcome and extensive use. It is thoroughly modern in treatment, accurate in statement and attractive in appearance. The authors' conception of their task is the selection of "the fundamental facts and principles of the science." Their "endeavor has been to help the student build up a coherent and substantial body of knowledge, and to develop an attitude of mind which will enable him to grapple with any botanical situation, whether it be teaching or investigation." From this standpoint the book will appeal strongly to teachers, whose chief complaint is that textbooks contain too much material and lay too little emphasis on the selection of what is really important.

The treatment of the selected topics is in general clear and well proportioned. Certain matters are presented with a degree of finality which may occasion surprise, e. g. the statement that "transpiration far from being a function of plants is an unavoidable danger" (p. 326). One may suppose that the skilful teacher will know how to utilize such a statement to provoke thought and discussion.

A noteworthy feature is the large number of very excellent illustrations. A great part of these is new or taken from recent publications. In this respect the work may well serve as a model.— W. J. V. O.

[1] Coulter, J. R., Barnes, C. R, and Cowles, H. C, A Textbook of Botany for Colleges and Universities. Vol. I. Morphology and Physiology. American Book Co., 1910. viii + 488 pages.

Vol. 12, no. 144, including pages 221 to 245 and title-page of volume, was issued 2 January, 1911.

Agnes Chase del.

CINNA ARUNDINACEA L.

Rhodora

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FLORA OF LOWER CAPE COD; THIRD NOTE.

F. S. Collins.

In my two notes on the plants of Cape Cod [1] I gave a general account of those conditions in the town of Eastham, Massachusetts, that would be likely to affect its flora, and also gave some notes as to the relative representation of different families, and the occurrence or non-occurrence of particular species. As to the first, there is nothing now to add, but as a result of another year's observations from May to September, 1910, I have something to add to the second. What I have observed this year shows that final conclusions cannot be drawn from anything but long-continued study; that the unexpected is always happening; and that there is a vast difference between positive and negative evidence. If you have found a certain plant in a certain place, you can safely say that it occurs there; if you have looked for it for years and not found it, it is not safe to say that the plant does not grow there. An illustration of this is the case of *Monotropa*. In the years 1906 to 1909 I had been watching for our two species of the genus, but unsuccessfully, and was fairly well convinced that they were not to be found in Eastham. But on the fifth of September, 1910, I began to see them frequently in places where I had often been before. There had been a rainy day, and as soon as the sunshine came again, the Monotropas came pushing up through the pine needles. These colorless plants always have a resemblance to mushrooms in appearance, and I was now struck

[1] On the flora of lower Cape Cod, Rhodora, Vol. XI, p. 125; Flora of lower Cape Cod; supplementary Note, Rhodora, Vol. XII, p. 8.

by another resemblance, their sudden growth under favorable conditions. In some places there were clumps of *M. uniflora,* twenty-five stems or more, 15 cm. high, the whole growth of which could not have taken more than the two or three days since the rain began; they had not grown through the layer of pine needles, but had pushed it up; the layer of needles rested on the top of the clump, but so loosely that a moderate rain would soon bring it down. After that I saw *M. uniflora* and *M. Hypopitys* everywhere in the pine woods.

Among the plants which I mentioned in my first note as not having been found in Eastham, but which I collected this season, are *Asclepias syriaca* and *Spiraea latifolia,* but neither was common. Of the *Spiraea* there were perhaps a dozen individuals, close together, but unusually well developed, each one and a half to two meters high. They were on land recently reclaimed from the influence of the sea, and everything in that station was larger than the normal. Nothing in this year's collecting invalidates the list that I gave of genera that one would expect, but that I did not find; *Rudbeckia, Arctium, Geranium, Thalictrum, Anemone, Aquilegia, Berberis, Desmodium* and *Crataegus;* to these I can add *Agrimonia, Aralia, Arisaema, Leontodon, Mimulus, Nepeta, Osmorhiza, Sanicula, Saxifraga, Urtica, Veronica,* and *Vicia.* While it is likely that representatives of some of these genera may yet be found here, it may be fairly assumed that the conditions are not favorable to them. Nearly all the species that this year's collecting added to the list belong to the category of "specialties" as understood in my first note, species found only in limited stations; among them *Myriophyllum humile, Sagittaria latifolia, Polygonum Muhlenbergii, P. sagittatum, Apocynum androsaemifolium,* and *Helianthus divaricatus;* none of them worthy of much note elsewhere, and here only on account of their scarcity and isolation. Of marine species, only one is to be noted, *Suaeda maritima;* in previous years all my *Suaeda* was *S. linearis,* this year all *S. maritima;* probably both species are common, but I had not noticed the distinction. Of the "domestic species" I can note *Euphorbia maculata;* I had been on the watch for this species, so common in most places, but it was not until September of this year that I found it; there was only a single plant, colored bright red, but without a trace of a spot on the leaves. Of *Taraxacum erythrospermum* I found two plants only, and of *Anthemis arvensis* var. *agrestis* only one. *Eragrostis megastachya* was common near my house. It is a handsome

grass, and the Manual speaks of it as common, but it has not been common for a very long time; when the flora of Middlesex County was compiled by Mr. Dame and myself, we could find only three localities in the county, two in mill waste and one in a dump. In my first note I mentioned *Plantago aristata* var. *Nuttallii,* a variety not in the Manual; in this variety the spikes are short and few-flowered, and the whole plant is much smaller than in typical *P. aristata.* This year I found both forms in abundance growing together, and in an uninterrupted series from the largest to the smallest; the distinction seems hardly justified. *Physalis pruinosa* was not uncommon in sandy roads; the berry is a rather bright yellow. To the species of *Solidago* already mentioned I can add *S. bicolor,* but only a few scattered plants observed; *S. puberula* is more common than I supposed. *Gerardia purpurea* and *G. pedicularia* occur, in addition to *G. paupercula,* already noted; and *Ranunculus sceleratus* can be added to *R. repens.* The total absence of *Desmodium* is all the more noticeable now that I have *Lespedeza Stuvei* and *L. procumbens* to add to *L. capitata,* all well developed and not uncommon. Eight miles up the Cape, at Brewster, where there is some approach to more ordinary conditions, *Desmodium* is found to a considerable extent, but it is all one species, *D. obtusum.* When we consider the great variety of Desmodiums found over nearly all New England, it is evident that the special Cape Cod conditions are distinctly unfavorable to this genus.

The common *Asclepias* in Eastham is *A. amplexicaulis,* but in some respects the plants did not agree exactly with the description in the Manual, according to which the leaves are very obtuse or retuse. In no case did I find a leaf with a retuse apex, and in some cases it could hardly be called obtuse but in every instance the midrib terminated in a distinct mucro. I preserved quite a suite of specimens and submitted them to Prof. Fernald, who tells me that there is no doubt as to the determination, specimens from other localities having the same characters. The absence of mention of another character in the descriptions is easily accounted for, as it is to be seen to advantage only in the fresh plant; the midrib of the leaf is bright red, and there is a very narrow red margin, distinct enough by its bright color, but of hardly measurable width; it soon fades out in the dried plant. In this species the leaves are regularly in pairs, with a long peduncle between the highest pair and the inflorescence; but one plant had the leaves in whorls of three, with a single well-developed leaf at the base

of the umbel. Another plant had flowers of a pale cream color, instead of the usual greenish purple.

The genus *Hieracium* is a prominent feature of the flora of summer and early autumn, five species being represented, all native; there are none of the introduced species that are establishing themselves in other parts of New England. *H. marianum*, *H. scabrum*, *H. Gronovii* and *H. canadense* present no difficulties, but the fifth species, which I had called *H. venosum*, puzzled me not a little, when I compared a large number of specimens. Some of these agreed with the Manual description "*leaves* nearly entire, scarcely petioled, thin, *glabrous*, and often purple-veined or mottled *above*, glaucous underneath," but in other individuals the leaves bore, often abundantly, long whitish hairs. I was tempted to refer these to *H. Greenii*, but when I found on the same plant one leaf green and hairy, another of apparently the same age purple veined and smooth, I was tempted to doubt the distinctness of the two species; when Prof. Fernald showed me specimens of *H. Greenii* from the middle states, I saw that it was not my Cape Cod plant. Undoubtedly all the specimens in question belong to *H. venosum*, but the leaves of that species are more variable than had been supposed.

Like the two preceding summers, the summer of 1910 was quite dry, and many of the shallower ponds nearly or quite disappeared. In many of these ponds or pools *Nymphaea advena* abounds, and as the water became low I could examine with comfort plants that usually would be quite out of reach. In addition to the normal floating leaves on long petioles, there were everywhere submerged leaves with short petioles, practically resting on the bottom. I had never seen these before, and was struck by their abundance, forming a large, handsome rosette at the base of each cluster of petioles. The Manual says "thin submerged leaves seldom present" but here they were at least as abundant as the ordinary leaves. They are thin and finely "crimped" in radiating folds, much like the scallop shell of southern New England; the petiole is hardly half as long as the blade, and is green, while the blade is a beautiful dull purplish red. As the normal leaves were mostly old and decaying, I thought at first that these might be young leaves of the same kind, which would later come to the surface as the petioles lengthened, but I afterwards saw buds and young leaves of quite different appearance, the blade thick from the first, the petiole rapidly lengthening. Later I found the

Nymphaea growing in places where the water had quite disappeared though the mud was still wet; here could be seen the decaying petioles of the normal leaves, the blades having quite disappeared; leaves in shape quite like those of the submerged rosettes, but thicker and greener, were borne on very short petioles, standing out almost horizontally, but not resting on the mud. I suspect that the submerged leaves are formed as the water becomes unusually shallow, and are utilized as aerial leaves by the plant when, by the disappearance of the water, the ordinary floating leaves are no longer available. The time at my disposal was too short for me to watch some particular plant or group of plants, and so get certainty in the matter.

I have already noted at Brewster the occurrence of *Desmodium* as indicating an approach to more ordinary conditions; a day's collecting here showed several other species which have apparently reached their limit; *Chimaphila umbellata, C. maculata* and *Silene latifolia,* for instance. The most interesting station at Brewster was at the bay shore, where the ordinary upland vegetation stops as it meets the influence of salt water. Here is quite a broad zone of rank vegetation; one can wander through "forests" of *Hibiscus Moscheutos* about up to one's head; every time I see this plant in flower it is a new delight, and I cannot think of anything in our most fertile regions that surpasses a field of this in full bloom. Along with this were various overgrown grasses and sedges; *Echinochloa Walteri, Scirpus validus, S. cyperinus* and *Spartina cynosuroides;* the occurrence of this last constitutes an extension of range, as it had not before been reported north of Connecticut. I selected the smallest plant of this species I could find; to get it into press I had to cut it into four pieces, and it fully occupied four pressing sheets. This luxuriant marginal flora is found all along the inside of the Cape, but this Brewster station is at the same time fully representative and easily accessible; it is less than fifteen minutes walk from railroad station at East Brewster; after the scanty flora of the fields and roadsides, the botanist will find it a delightful surprise; if he visits it as I did in August or early September, he will hardly be able to resist the temptation to pick some of the *Hibiscus* for its beauty, but a very few plants of this, with specimens of the *Spartina* and *Scirpus,* will make quite a large armful, and he may be glad, as I was, to accept a "lift" from another collector who had been working in the neighborhood, and was driving to the R. R. station. His collection consisted of two barrels of clams, but his kindness in taking me and my collection was none the less wel-

come. At Brewster, in dry sandy ground, I found a *Cyperus* that we seldom see near Boston, but which is apparently common here, *C. Grayii.*

In addition to *Spartina cynosuroides* just mentioned, two other species are to be recorded, with extension of range. *Paspalum psammophilum* was found in a sandy field in Eastham; the Manual gives its range as "so. N. Y. to Del." but it cannot now be called new to New England, as it has recently been found on Nantucket.[1] The present Eastham station is, however, the first on the mainland of New England. The other species is not a native, but comes from Australia or New Zealand, regions that have contributed very little to our introduced flora. *Chenopodium carinatum* R. Br. was found at three stations in Truro and two in Eastham, September 9 and 10. It probably did not come directly from New Zealand, but from California, where it has become established in recent years. It is not likely that many readers of this note will find a description of this species in any work they have at hand, and it may be well to give its principal characters. In general, the species may be said to resemble *C. Botrys* L., being glandular-pubescent and aromatic and having small erect seeds. It is prostrate and freely branched; the leaves are 1–2 (rarely 3) cm. long, oblong-lanceolate and sinuate-pinnatifid; the axillary inflorescences are short or subglobose glomerules instead of loose panicles as in *C. Botrys*; and the tiny sepals are prominently thickened on the back. The genus *Chenopodium* is looked upon rather askance by botanists who are not specially Chenopodiologists (I hope I may be pardoned the word, not knowing whether it is here used for the first time); but the species in question is rather attractive in appearance, and not at all like the rank and weedy Chenopodiums that abound in waste, and too often in cultivated places. I think I have seen it the past year near Boston, but my Eastham plant was then still an undetermined species to me, and by the time I had learned its identity it was too late to look for it this season.

All my Cape Cod plants of this year's collecting, including some from Yarmouth and some from Mattapoisett, the latter not strictly belonging to the Cape, but growing under similar conditions, have been deposited in the herbarium of the New England Botanical Club, after being identified by Prof. Fernald, to whom my hearty thanks are due.

Malden, Massachusetts.

[1] Bicknell, Plants of Nantucket, Bull. Torrey Bot. Club, Vol. XXXV, p. 182 (1908).

SOME BOREAL SPECIES AND VARIETIES OF ANTENNARIA AND ANAPHALIS.

M. L. Fernald and K. M. Wiegand.

The Genus Antennaria in Newfoundland.

Two species of *Antennaria, A. canadensis* Greene and *A. neodioica* Greene, have heretofore been known to extend northeastward to Newfoundland, but during the past summer our explorations brought to light several others upon the western coast: *A. petaloidea* Fernald at one station; a fourth species which for proper identification must await further field study; and the two plants which are described below.

Antennaria **eucosma** n. sp., argenteo-sericea plus minusve stolonifera; stolonibus gracilibus procumbentibus paullo subterraneis bracteosis, bracteis paucis brunneis; caule florifero 8–25 cm. alto sericeo-tomentoso; foliis utrinque sericeo-tomentosis acutis vel breve acuminatis apice obtuse callosis, basilariis erectis lanceolatis vel oblanceolatis rare ellipticis petiolatis 3-nerviis 5–16 cm. longis 5–15 mm. latis, caulinis 4–7 valde minuantibus, superioribus lineari-attenuatis 7–20 mm. longis; corymbo denso vel glomeruliformi; capitulis foemineis 3–10, involucro 7–10 mm. longo basi lanato, bracteis exterioribus ovatis vel oblongis, interioribus lanceolato-linearibus, omnibus apice scariosis conspicue brunneis vel castaneis, stylis brunneis vel purpurascentibus; capitulis masculis similibus minoribus, involucro circa 6 mm. longo, pappi setis apici paullo incrassatis usque ad apicem serrulatis.

Silvery sericerous, more or less stoloniferous; stolons (and rootstocks) slender, procumbent, slightly subterranean, with few brown scaly bracts and a tuft of long erect terminal leaves: flowering stem slender, 8–25 cm. high, silky-tomentose: leaves silky-tomentose, acute to short-acuminate, with a blunt callous tip; the basal and those of the stolons upright, lanceolate to oblanceolate, rarely elliptical, tapering gradually to a distinct petiole, 3-nerved, (2–) 5–16 cm. long, 5–15 mm. broad; the 4–7 cauline rapidly diminishing in size; the uppermost linear-attenuate, 7–20 mm. long: corymb dense or glomerulate: pistillate heads 3–10; the involucres 7–10 mm. high, lanate at base, the outer bracts ovate or oblong, the inner lance-linear, all with conspicuous brown or castaneous scarious tips: styles dark-brown or purple: staminate heads similar, smaller; the involucres about 6 mm. high; pappus-bristles slightly thickened upward, serrulate to the tip.— Newfoundland: abundant on dry limestone barrens, upper

slopes and tablelands, altitude 200–300 m., Table Mountain, Port au Port Bay, August 16, 1910, *Fernald & Wiegand*, no. 4144 (TYPE in Gray Herb.).

Antennaria eucosma is a remarkable plant, combining characteristics of the *A. plantaginifolia* group of species with those of *A. carpatica* and its allies. It differs at a glance from all the species of the former series by its very elongate upright lanceolate leaves which closely match those of *A. pulcherrima* (Hook.) Greene, a Rocky Mountain species allied to the Old World *A. carpatica* (Wahl.) R. Br. From *A. pulcherrima*, *A. lanata* (Hook.) Greene (also of northwestern America), and *A. carpatica* it is distinguished at once by its slender elongate rootstock and slender horizontal stolons. From *A. pulcherrima*, which it resembles in foliage and pubescence, it is further distinguished by its fewer larger pistillate heads with long dark involucral bracts, its smaller staminate heads with less dilated and more uniformly toothed pappus-bristles; from *A. lanata* by its sericeous pubescence, larger pistillate heads with brown rather than lead-colored bracts; and from *A. carpatica* by its much larger habit, broader uniformly sericeous 3-nerved leaves, larger heads with brown involucres, etc.

An old specimen in the Gray Herbarium collected on Anticosti by Pursh is apparently referable to this species, but the material is inadequate for final determination. This is presumably the plant referred to by Hooker as his *A. carpatica, a, humilis* (Hook. Fl. Bor.-Am. i. 329), but Hooker's description and bibliographic citations show his var. *humilis* to be typical *A. carpatica*. The Anticosti plant was likewise referred by Gray (Syn. Fl. i. pt. 2, 232) to true *A. carpatica*.

ANTENNARIA ALPINA (L.) R. Br., var. **cana**, n. var., foliis utrinque sericeo-tomentosis, tomento denso cano.

Like typical *A. alpina* but with the leaves permanently whitened on both sides with a close silvery tomentum.— *A. alpina*, var.—, Hartman, Skand. Fl. ed. 11, 13 (1879).— Apparently rare in Scandinavia, where the true *A. alpina*, with the leaves bright green and glabrous or glabrate above, is the common form of the species; but apparently largely replacing in eastern America the typical green-leaved plant. The following specimens have been examined by us. NORWAY: Dovre, June 28, 1870, *Zetterstedt & Wickbom*; Dovre, without date, ex herb. *Klatt*. GREENLAND: e. Greenland, *Wormskjold*; Disco and Godthaab, July 14, 1892, *W. E. Meehan*, no. 38; Godthaab, Sept. 7, 1894, *H. E. Wetherill*, no. 20; Nugsuak Peninsula, August 12,

1896, *Cornell Party.* LABRADOR: near Hebron, *Mentzel*; Rama, August 20, 1897, *J. D. Sornborger,* no. 156; Port Manvers, August 11, 1900, *E. B. Delabarre.* NEWFOUNDLAND: dry limestone barrens, Pointe Riche, August 4, 1910, *Fernald & Wiegand,* no. 4139 (TYPE in Gray Herb.); dry limestone barrens, altitude 200–300 m., Table Mountain, Port au Port Bay, August 16, 1910, *Fernald & Wiegand,* no. 4141.

Although the character here used to distinguish the var. *cana* is often used as a key-character to separate such species as *A. neodioica* Greene and *A. canadensis* Greene or *A. plantaginifolia* (L.) Richardson and *A. Parlinii* Fernald, it is found in those cases to be only one of several characters which differentiate the species. In *A. alpina,* var. *cana,* however, we have been unable to find any other character by which the plant may be separated from *A. alpina.* It is of course barely possible that var. *cana* may eventually prove to be specifically distinct, but the writers are rather of the opinion that, when better known, *A. alpina* will be found to be a circumpolar species and that many high-northern and alpine plants which have been recently put forward as species will prove to be better treated as geographic varieties or else as subspecies.

ANAPHALIS MARGARITACEA AND ITS VAR. OCCIDENTALIS.

In 1905 *Anaphalis margaritacea,* var. *occidentalis* Greene, with the very large flat leaves bright green and glabrous above, was reported [1] from Gaspé County, Quebec, and from southwestern Newfoundland; and subsequently, prior to the issue of the 7th edition of Gray's Manual, it was found to extend up the St. Lawrence to the northeastern edge of the Manual range. In the summer of 1909 the present writers found the variety, sometimes in most characteristic development, sometimes passing very clearly to the ordinary form of the species (which has the shorter narrower upper leaves usually whitened above and tending to become revolute at the margins) at various stations on the coast of Washington County, Maine, and in the valleys of the St. John and Aroostook Rivers; and during the past summer, in Newfoundland, further observations have been made with the conclusion that, so far as our experience and herbarium materials show, typical *A. margaritacea,* such as is widely distributed from New Brunswick across New England, is unknown in Newfoundland. In its place are found characteristic var. *occidentalis* or a form with the leaves quite as pubescent above as those of *A. margaritacea,* but

[1] Fernald, RHODORA, vii. 156 (1905).

with the uppermost broad and flat and only slightly reduced in length, thus simulating those of var. *occidentalis*. Similar transitional specimens occur on the continent,— in Quebec, Nova Scotia, New Brunswick, Maine, etc.— indicating that northeastward *A. margaritacea* of our hot dry pastures passes by numerous gradations to the extreme var. *occidentalis* of the cooler and moister region of the Bay of Fundy and the Gulf of St. Lawrence.

When *Anaphalis margaritacea*, var. *occidentalis* was first described [1] it was supposed to be restricted to the Pacific slope: "common among sand hills of the seaboard from at least middle California to Alaska." In 1905 [2] it was considered as belonging to the Pacific slope and to the region of the Gulf of St. Lawrence; but now, after studying the material in the Gray Herbarium in the light of a fuller field-experience, we find that var. *occidentalis*, like the majority of plants which occur both in the Northwest and in the boreal areas of eastern Canada, has intermediate areas in the cooler and moister regions across the continent,— in the Great Gulf of the White Mountains, about the Upper Great Lakes, in the Black Hills, and in the northern Rocky Mts. It is, furthermore, discovered that the common plant of northern Asia is var. *occidentalis* rather than typical *A. margaritacea* as is the plant commonly cultivated and now somewhat naturalized in Europe. Since it is stated that the cultivated plant of Europe (var. *occidentalis*) was introduced from America "about the sixteenth century," [3] it is probable that it was carried thence from Newfoundland or eastern Canada.

The preceding notes may be briefly summarized as follows:

ANAPHALIS MARGARITACEA (L.) B. & H. Leaves very numerous, 38–66 (average 51), linear or linear-lanceolate, white-tomentose above or tardily glabrate; those immediately below the inflorescence 1.5–6.5 (av. 3.6) cm. long, 1–3 (av. 2) mm. wide.— Clearings and dry sterile soil, eastern Quebec to Alaska, south at least to Pennsylvania, northern Ohio, South Dakota, New Mexico, and California; [4] apparently rare in Asia. Passing in cooler or moister regions to

[1] Greene, Fl. Franciscana, 399 (1897). [2] Fernald, l. c.

[3] Syme, Engl. Bot. v. 77 (1873).

[4] The southern distribution as here given is based upon specimens seen. The species has been reported from more southern states,— North Carolina ("Middle and Upper Districts," *M. A. Curtis*), "mountains of the Southern States!" (*Torrey & Gray*), West Virginia (*Millspaugh*), etc.; but no specimens have been examined by the writers from south of Pennsylvania and they are informed by Professor N. L. Britton that at the New York Botanical Garden there are no more southern specimens. The Ohio record is upon the authority of Professor J. H. Schaffner who has kindly verified the occurrence of the plant near Cleveland.

Var. OCCIDENTALIS Greene. Leaves fewer, 15–48 (av. 36), bright green and glabrous (or if whitened soon glabrate) above, those immediately below the inflorescence 5–12 (av. 7.8) cm. long, 5–20 (av. 10) mm. wide.— Gravelly or sandy soils and along streams, Newfoundland to Alaska, south to Washington County, Maine, Great Gulf, White Mts., New Hampshire, Minnesota, South Dakota, Colorado, and California; also in Asia and introduced in Europe. Ascending in the Shickshock Mts., Gaspé Co., Quebec, along mountain brooks to 625 m. and known in New Hampshire only from banks of a stream in the Great Gulf, altitude 1070 m. (*A. S. Pease*).

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—VIII.

THIS report on *Cyperaceae* has been based on carefully determined specimens. These are in the Gray Herbarium, and the herbaria of the New England Botanical Club, Wellesley College, the Boston Society of Natural History, the Peabody Museum at Salem, and the private herbaria of Messrs. J. R. Churchill, Walter Deane, C. A. & A. W. Cheever, C. H. Knowlton, A. S. Pease, W. P. Rich, R. A. Ware and E. F. Williams.

There proved to be extant so many specimens over fifty years old, that it has seemed best to limit such citations, as they are matters of merely secondary interest. Henceforth only such aged specimens as are of special note will be quoted.

The reports received, in connection with the Essex, Middlesex and Metropolitan Park Floras, have given adequate data for the common species, but there are still very large areas on the west and south which are little known. We urge all who have herbaria to join us in this work, or to report additions at any time.

CYPERACEAE.

CYPERUS.

C. aristatus Rottb. Sandy strands of fresh-water ponds. Mystic Pond (*Wm. Boott*, Oct. 1, 1876; *C. E. Perkins*, Aug. 2, 1882; *W. P. Rich*, Sept. 29, 1891); Cambridge (*B. D. Greene*, no date); Concord (*H. Little*, no date); Heard's Pond, Wayland (*E. Hunt*, July, 1873;

A. J. Eames & C. H. Knowlton, Sept. 6, 1909; *M. L. Fernald*, Sept. 10, 1909; *K. M. Wiegand*, Sept. 21, 1909); Lake Cochituate, Natick (*K. M. Wiegand*, Oct. 1, 1909. See Rhodora, xii, 39, 1910).

C. dentatus Torr. Wet shores and marshes, abundant throughout.

C. dentatus Torr., var. **ctenostachys** Fernald. Plum Island, Essex Co., with type and intermediates (*J. Robinson*, Aug. 26, 1878); "along the gravelly pond shores below spring level, not rare," Houghton's Pond, Milton (*A. W. Cheever*, Aug. 18, 1905).

C. diandrus Torr. Low ground, in sand, gravel or mud. Not reported from the three southern tiers of towns; abundant in the rest of the district. Collected in Sudbury meadows by Francis Boott in 1819, and at Danvers by B. D. Greene in 1846.

C. Engelmanni Steud. Borders of ponds. Fresh Pond, Cambridge (*Wm. Boott*, Aug. 20, 1853. Since then collected by various others down to 1908); Spy Pond, Arlington (*H. A. Young*, Sept. 21, 1879; *C. E. Perkins*, September, 1881); Little Pond, Belmont (*H. A. Young*, Sept. 21, 1879); Framingham (*T. Morong*, September, 1886; *A. J. Eames & C. H. Knowlton*, Sept. 6, 1909; abundant, Farm Pond, *K. M. Wiegand*, October 9, 1909).

C. erythrorhizos Muhl. Wet sandy and muddy shores. Newburyport (*A. A. Eaton*, Oct. 3, 1896); Lawrence (*J. Robinson*, Sept. 26, 1877. Various other collectors down to 1901); Winter Pond, Winchester (*H. H. Bartlett, J. R. Churchill & C. H. Knowlton*, Sept. 15, 1906).

C. esculentus L. Moist soil and cultivated ground. Amesbury, West Newbury, Lawrence, South Boston, Concord, Wayland, Framingham; Danvers (according to Robinson, Fl. Essex Co. 115, 1880); Lowell, Tewksbury and Dracut (according to Dame & Collins, Fl. Middlesex Co. 111, 1888).

C. ferax Richard. Low ground and marshes, near fresh or brackish water. Scattered stations in eastern portion of district; known in the Fenway, Boston, from September, 1878, to the present.

C. filiculmis Vahl. Dry sterile soil; Malden, Woburn, Winchester, Cambridge, Charlestown, Boston, Quincy, Hull, Sharon, Norfolk, Wellesley.

C. filiculmis Vahl., var. **macilentus** Fernald. Very common throughout.

C. fuscus L. "Near Revere beach, 1877 (Herbert A. Young)" according to Robinson, Fl. Essex Co. 116, 1880). It was also col-

lected in the same locality, on the edge of a spring in a railway ditch by C. E. Faxon, Sept. 26, 1878 (specimen in Gray Herb.), by H. A. Young, September, 1879 (specimens in Gray Herb. and herb. Essex Co.), and by W. P. Rich, Sept. 21, 1890 (specimen in herb. W. P. Rich). This station is now undoubtedly extinct.

C. Grayii Torr. Sand dunes, Plum Island, Essex Co. (*W. P. Conant*, Sept. 26, 1878, and others since). Never reported at any other station north of Plymouth, which is 55 miles away.

C. Nuttallii Eddy. Along the entire coast, chiefly in brackish marshes. Found also at Winter Pond, Winchester. Collected by John A. Lowell in Roxbury, Sept. 17, 1846.

C. OVULARIS (Michx.) Torr. "West Boston Flats" (*C. W. Swan*, Sept. 25, 1880. Specimen in herb. N. E. Bot. Club). Introduced, but undoubtedly long since extinct.

C. rivularis Kunth. Moist soil; undoubtedly common, but reported from only nine eastern and northern towns.

C. strigosus L. Wet sunny places, very common throughout.

C. strigosus L., var. **capitatus** Boeckl. West shore of Spot Pond, Stoneham (*W. P. Rich*, Sept. 20, 1894); sandy shore, Winter Pond, Winchester (*H. H. Bartlett*, Aug. 26, 1905; *G. G. Kennedy*, Aug. 10, 1893, and Oct. 20, 1901); West Cambridge (*Wm. Boott*, Nov. 5, 1865); pond border, South Framingham (*T. Morong*, September, 1886).

C. strigosus L., var. **compositus** Britton. Probably introduced in wool and cotton waste near Goulding's Mills, Malden (*F. S. Collins*, Sept. 25, 1887); Green Lodge, Canton (*G. G. Kennedy*, Aug. 8, 1887); Monponsett Pond, Halifax (*Wm. Boott*, Sept. 23, 1870).

C. strigosus L., var. **robustior** Kunth. Moist soil, Winter Pond, Winchester (*C. H. Knowlton*, Sept. 15, 1906).

DULICHIUM.

D. arundinaceum (L.) Britton. Wet places, usually in standing water. Not reported from extreme western and southern portions; abundant elsewhere, and probably throughout.

C. H. KNOWLTON
J. A. CUSHMAN
WALTER DEANE
A. K. HARRISON
} *Committee on Local Flora.*

NOTES ON CONNECTICUT PLANTS.

C. H. Bissell.

Agrostis canina L. Hillside on border of woods, Sharon (*C. A. Weatherby, R. W. Woodward & C. H. Bissell*). First found in an autumnal state with decumbent culms and forming clusters of leaves at each joint giving the plant a most peculiar appearance.

Scirpus Smithii Gray. Gravelly shore of Pocotopaug Lake, Chatham (*R. W. Woodward & C. H. Bissell*).

Scirpus Smithii Gray, var. setosus Fernald. Wet alluvial soil below the dam at Beach Pond, Voluntown (*C. H. Bissell*). This variety has not before been reported from Connecticut.

Hemicarpha micrantha (Vahl) Pax. Sandy beaches, Pocotopaug Lake, Chatham, and Congamond Lakes, Suffield (*R. W. Woodward & C. H. Bissell*). Both these localities are extensions of range for this rare little sedge.

Rynchospora capillacea Torr. Open grassy moist border of Beaslick Pond, Salisbury (*Mrs. C. S. Phelps*).

The margin of Beaslick Pond is of botanical interest because there, within a space not more than a rod square, can be found growing three very rare sedges, *Rynchospora capillacea*, not before reported from Connecticut, *Carex Crawei*, known in the state only from this locality and rare in any case so far south, and *Scleria verticillata* hardly known elsewhere in New England. This last named species was formerly known at another locality in Salisbury but has been destroyed there by flooding from a dam.

Carex aestivalis M. A. Curtis. Hillside woods and shaded roadsides, scattered over quite an extent of territory, Norfolk (*R. W. Woodward & C. H. Bissell*). This rare sedge was first found in Connecticut by A. E. Blewitt in June, 1909, in Salisbury; in Sept., 1909, Prof. M. L. Fernald found it in Colebrook, so it is now known from three localities, all in the northwestern part of the state.

Carex novae-angliae Schwein. Hillside, in rocky woods, preferring the more open places, Norfolk, near Grant's Station (*R. W. Woodward & C. H. Bissell*). The plant was plentiful over a section of perhaps an acre in extent; it has not before been reported from the state.

Juncus effusus L., var. conglomeratus Engelm. Open swamp, Voluntown (*C. H. Bissell*). Before this known in New England only from a swamp in Franklin, where it was collected by Mr. R. W. Woodward.

Chenopodium glaucum L. About railroad tracks at Canaan station, North Canaan (*M. L. Fernald*). In 1909 Prof. Fernald found only a few plants but in 1910 they were plentiful and extended for some distance along the tracks.

Clematis verticillaris DC. Killingly, near the Rhode Island line (*C. H. Knowlton*). The Connecticut Catalogue gives the eastern limit of this species as Bolton, unfortunately overlooking this locality.

Trollius laxus Salisb. Woods near Falls Village, Canaan (*Miss M. J. Whitney*). It is a pleasure to be able to record another locality for this plant as until now the Cornwall locality was the only known one in New England.

Rosa canina L. Roadsides and border of fields, Portland (*Mrs. F. W. Starmer*), Salisbury (*Mrs. C. S. Phelps*). A rather rare escape.

Rosa nitida Willd. Old pasture bordering cedar swamp, Plainfield (*C. H. Bissell*). This species has not before been known south of the town of Thompson.

Prunus americana Marsh., var. mollis T. & G. Roadside in rocky ground, East Granby (*H. S. Clark, C. A. Weatherby & C. H. Bissell*). First collected very late in the season and then thought to be *P. nigra*. Later, Mr. Weatherby collected better material and found the plants to be of this variety. This is a plant of the Southwest and must have been introduced at this place where it has spread and there are now many shrubs. Not before recorded from the state.

Lespeseza hirta (L.) Hornem., var. oblongifolia Britton. Glastonbury (*Mrs. F. W. Starmer*). This variety seems not to have been previously recorded north of New Jersey and its occurrence here is quite an extension of range.

Lechea marirtima Leggett, var interior Robinson. Roadsides and open woods in sandy soil, Enfield and Suffield (*R. W. Woodward & C. H. Bissell*). This material is not exactly typical; it has the pubescence and small pod of this variety, but the inflorescence is inclined to be elongated as in *L. intermedia* rather than pyramidal, as it should be in this variety.

Hedeoma hispida Pursh. Dry sandy hillside, Portland (*C. H. Bissell*). Apparently native at this locality. Known from only one other locality in the state and there seemingly introduced.

Pycnanthemum Torrei Benth. Dry rocky woods, New Haven (*R. W. Woodward & C. H. Bissell*). Not before reported from the state.

Veronica Anagallis-aquatica L. Moist ground along railroad in a little cut near the Canaan railroad station, North Canaan (*C. A. Weatherby*). Mr. Weatherby collected this in the fall of 1909, when the plant was in too poor condition to furnish good material, but determined it as above. In the summer of 1910 Dr. E. L. Greene, not knowing of Mr. Weatherby's collection, discovered the same locality. Dr. Greene informs me that he does not find any European specimens that exactly match his material but there seems to be no other name for our plant at present. There was an old report of this species from East Hartford but this was later proved to be an error. The North Canaan locality is thus the only one in the state for this species.

Mitchella repens L., forma **leucocarpa**, f. nov., fructu laete albo, ceteris formae typicae simillima.— Collected in Cornwall, Connecticut, during the past summer by Miss M. J. Whitney. In the Bulletin of the Torrey Botanical Club iii. 43 (1872) there appeared (over the initials S. W. A.) a note recording the discovery of a white-berried form of Mitchella at Canaan, Connecticut. Miss Whitney to whom I am indebted for specimens states that she has known of a colony for several years which always has white fruit. As it is evident that the form has perpetuated itself or at least has persisted for a considerable time, it seems worthy of a name.[1]

Solidago canadensis L. Alluvial soil along Farmington River, New Hartford, (*C. H. Bissell*). This is the second reported locality for this species in the state, the other being Selden's Cove, Lyme.

Aster Lowrieanus Porter. Rocky woods, Cheshire (*A. E. Blewitt & C. H. Bissell*). Many plants including some of the var. lanceolatus Porter and also intermediate forms.

[1] [Other references to white-fruited *Mitchella repens* are as follows: J. Robinson, Fl. Essex Co., Mass., 60 (1880); Britton, Bull. Torr. Bot. Club, viii. 111 (1881), where the plant is recorded from Moravia, Cayuga Co., New York (*Dr. Charles Atwood*); Gray, Syn. Fl. i. pt. 2, 31 (1884); Dame & Collins, Fl. Middlesex Co., Mass., 45 (1888); and Britton, Bull. Torr. Bot. Club, xvi. 196 (1889), where the form is reported from Stow, Massachusetts (*A. W. Hosmer*). In the Gray Herbarium there are white-fruited specimens from Moravia, New York, *Dr. M. F. Merchant*; Keene, New Hampshire, *Eliza J. C. Gilbert*, and York, Pennsylvania, *Miss Kate Fisher Kurtz*, a collection mentioned by Thomas Meehan (Monthly, iii. 50, 1893) and incorrectly stated to have been the original discovery of the form.— Ed.]

Aster longifolius Lam. Border of woods in moist sandy soil, Enfield (*R. W. Woodward & C. H. Bissell*). Known from but few localities in the state.

Gnaphalium purpureum L. Rocky pasture near Great Hill Pond, Portland (*R. W. Woodward & C. H. Bissell*). Previously known only from the southeastern corner of the state.

Ambrosia psilostachya DC. Roadsides in Bridgeport and Stratford (*H. S. Clark*). Doubtless introduced from the West.

Southington, Connecticut.

NOTES ON CERTAIN LEGUMINOSAE.

C. H. Knowlton.

The recent note by Mr. Walter Deane, in Rhodora for November, 1910, has prompted me to publish the following information in regard to *Desmodium canescens* (L.) DC. and other species of the same family.

Desmodium canescens (L.) DC. I first collected Sept. 4, 1898, in Natick, Mass. The station at that time contained but a few vigorous plants. It is on Woodland Street, between Natick and South Natick, in gravelly soil. The oak woods in the vicinity are full of various other more common species of *Desmodium* and *Lespedeza*. I revisited the station in August, 1907, and again, Aug. 29, 1908, the latter time with Messrs. J. R. Churchill and H. A. Purdie. We found that the plant had spread considerably, occupying both sides of the road for a rod or more. The plant seemed flourishing, but on account of the dry season had produced but little fruit.

Lespedeza capitata Michx., var. *velutina* (Bicknell) Fernald, I have collected but once, in dry sand at Pelham, N. H. It is a very definite variety, and the name is well chosen, for its soft tomentum is entirely different to the touch, from the silky or glabrate forms of the type. The date of this collection was Oct. 11, 1902.

Vicia tetrasperma (L.) Moench. grows abundantly in the edge of oak woods near the salt marsh at East Weymouth, Mass. It had already begun to fruit at the time of its collection, June 6, 1908. I have found it beside the sea at Castine, Me., and on a railroad em-

bankment at Cumberland, Me., where it was first discovered by Mr. E. B. Chamberlain (Rhodora, vi. 195).

Vicia hirsuta L. I found on July 4, 1898, in moist woods on the World's End farm at Hingham, Mass. It is not included in Thomas T. Bouvé's very comprehensive flora of Hingham.

Vicia villosa Roth. Mr. W. P. Rich and I, while collecting in Marshfield, Mass., July 3, 1910, came across what we supposed to be luxuriant specimens of *V. Cracca* L. They grew in a dry field which had evidently not been in recent cultivation. Study of the pressed specimens shows them to be *V. villosa* Roth., easily distinguishable by villous stems, peduncles and leaves, and more vigorous growth. In *V. Cracca* the flowers are 10–12 mm. in length, in this species 13–16 mm. The pods, too, are larger, in my specimen 3.2 cm. long by 1 cm. wide.

Cassia marilandica L. I collected this species Sept. 3, 1902, in Chelmsford, Mass. It grew by the roadside near a brook, and had probably escaped from cultivation, as there is a house near. The place has been mowed in recent years, and I do not know whether the roots still persist or not.

Trifolium dubium Sibth. I first collected this at Hyannis, Mass., June 15, 1909. It is very abundant there. This year I found it very common on Nantucket, and also at Harwich. Mr. F. S. Collins, in Rhodora xi. 131, speaks of this plant as not infrequent in Eastham. This species seems to blossom a month earlier than its nearest relative, *T. procumbens* L. It is very slender, with few-flowered heads 6–8 mm. in diameter. Apparently this is identical with the little shamrock plant of which the city florists raise so many specimens for the early spring trade.

Hingham, Massachusetts.

Bartlett's Dioscoreae of the United States.— Bulletin 189 recently issued by the Bureau of Plant Industry, U. S. Department of Agriculture, contains matter of taxonomic interest not usually looked for in the publications of a bureau more especially devoted to the economic phases of botany. It is entitled, "The Source of the Drug Dioscorea, with a consideration of the Dioscoreae found in the United States. By Harley Harris Bartlett, Washington, 1910." The subject is treated under two heads. "Taxonomic history of the Dioscoreae of the United States," and "The Drug Dioscorea."

The latter mainly considers the rhizome of *Dioscorea*, the part used in pharmacy. It is well illustrated by figures that will prove of value also in identifying the plants by the subterranean portions of their stems. The former is a monograph of the *Dioscoreae* of the United States as viewed and elaborated by Mr. Bartlett. It is well known that but one species, *D. villosa* L., is given in all recent books treating the flora of this area. Bartlett makes five, three with names which had been used by previous authors, with two new species and one new variety. From maps that accompany the text showing the distribution of the three with revived names it is seen that they come into the "Manual region." They are (1) *D. paniculata* Michx., the most widely distributed species, from southern New England to eastern Kansas and Oklahoma, but most abundant in the north central States; (2) *D. glauca* Muhl., from Pennsylvania through the two Virginias, Kentucky and southward, but "being essentially a plant of the mountains" it is mainly found along the Appalachian belt; (3) *D. quaternata* (Walt.) Gmel., principally southern, coming into the "Manual region" in western Kentucky and eastern Missouri. *D. paniculata* var. *glabrifolia* Bartlett mostly replaces the typical form in the southwestern part of its range but is represented in Connecticut, Pennsylvania, Maryland and Missouri. The writer has a fruiting specimen of *D. paniculata* from southwestern Michigan that from the description would go with the variety, being perfectly smooth. The two new species, *D. hirticaulis* Bartlett and *D. floridana* Bartlett are southern species of the Atlantic coastal plain.

It will be seen from this that *D. villosa* L. does not appear in this list. The reason given by Mr. Bartlett for dropping it is that provision of the Vienna code which allows a name to be discontinued "when the group which it designates embraces elements altogether incoherent, or which become a permanent source of confusion and error." The only basis for a type, if such it could be called, found in the herbarium of Linnaeus, is a sheet with an American plant; "at the bottom of which," according to Dr. B. Dayton Jackson, Secretary of the Linnaean Society, "is a note by Linné himself, '6 K sativa,' to which Smith has added in pencil, 'non est." No specimen named "*villosa*" by Linnaeus was found by Dr. Jackson in the herbarium. *D. sativa* L. is an East Indian plant, and since the sheet is marked as collected by Kalm ("K = Kalm") but named *sativa*, there is evidently a mistake or a confusing of Asiatic and American species, since Kalm collected in America. A. De Candolle found a similar confusing of species of *Dioscorea* by Linnaeus when he considered the origin of cultivated plants in his "Géographie Botanique," and more fully treated in a later work "L'Origine des plantes cultivées."[1] Under the name *D. sativa* Linnaeus had confounded several Asiatic and American species. Grisebach, in his "Flora of the

[1] *l. c.* p. 62.

British West Indies," mentions five species or forms that he deems thus comprised under *D. sativa*.[1] But De Candolle found a way out of the muddle without abandoning the name, leaving *D. sativa* L. for a plant cultivated in Ceylon "with which Linnaeus was acquainted." Such an opening did not seem available to Mr. Bartlett.

Matters were equally confusing and unsatisfactory as a basis for a "book species." For details and for the adoption of the names of three of the species that had previously been used, the reader is referred to the work itself. Taken altogether the author seems well justified in abandoning the name *D. villosa* L. We may regret the loss of a name of long standing, as we do in a similar case of Sargent's dropping for the same reason *Crataegus coccinea* L. But with *D. villosa* there is some compensation on the sentimental side for leaving a specific term that literally could not apply to the plant, or as Gray has expressed it in the earlier editions of his Manuals, "A bad name, for the plant is never villous, but often nearly smooth."

It is also apparent from all this that the "Linnaean concept of species," much emphasized by some, especially if not systematists, comes at times to be a very hard thing to apply in practice. However good in itself as a "concept," when it becomes so intangible that it cannot be run down and captured, it seems the part of wisdom to give up the chase.— E. J. Hill, Chicago, Illinois.

[1] *l. c.* p. 588.

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A NEW ARABIS.

E. B. Harger.

In the spring of 1907 I found an *Arabis*, which was not familiar to me. It was growing on a trap ridge in Southbury, Connecticut, and from its habit as well as its erect young pods I took it at first to be *A. Drummondi* Gray, but was puzzled by some unusual features. Later collections showed the pods spreading or recurving, with seeds similar to those of *A. laevigata* (Muhl.) Poir. I soon learned from Dr. E. H. Eames that he had collected the vernal state of the same plant in a similar situation in the adjoining town of Woodbury and that he also had taken it for *A. Drummondi*. Then Mr. C. A. Weatherby reported collecting at Bolton, Connecticut, further specimens of the same form which, on comparison at the Gray Herbarium, he found to match material there included under *A. laevigata*.

I continued to observe my plant only to be more and more convinced that it was distinct from what I had known as *Arabis laevigata*, and a visit to the Gray Herbarium showed that the two forms were well represented there and were separated by marked and constant characters.

The new plant is bright green and very leafy, averaging in the specimens examined 28 internodes to the first flower. Some or usually all of the lower leaves are deeply lyrate-pinnatifid and the flowers are white with conspicuous petals and on erect pedicels.

Arabis laevigata is less leafy, averaging 13 internodes to the first flower, is strongly glaucous and very rarely has any pinnatifid lower leaves. Its flowers are borne on diverging pedicels and the petals scarcely exceed the calyx. One of the most marked differences between the two plants, and one which appears to be constant, is

to be found in the rosette of leaves of the first year. As I was collecting *Arabis laevigata* for comparison I found growing with it young plants of such a different aspect that I could not at first believe that they were the seedlings of this species, but further observation convinced me that they could be nothing else. These young plants in May and June of the first year produce spatulate to broadly obovate leaves, sometimes reaching 8 cm. long by 4 cm. broad, which are sparsely to somewhat thickly pilose, especially above, with very short stiff hairs. This character seems to have been overlooked for the most part as all the later descriptions which I have consulted as well as most of the earlier ones speak of *Arabis laevigata* as entirely glabrous. However, DeCandolle in his *Systema Naturae* says: — "Folia radicalia . . . . superne pilis rigidulis sparsis scabra," and, as will be seen later, the type-specimen shows just this character. Later in the season the leaves are smaller and more spatulate with fewer hairs, but I have yet to see a specimen of *Arabis laevigata* with the leaves of the first year preserved which does not show upon them some of these characteristic hairs.

In the new plant the leaves of the first year are all spatulate to narrowly obovate and perfectly smooth and glabrous. They are much more persistent than those of *A. laevigata*, being usually well preserved at flowering time and consequently are usually found on herbarium specimens. The flowering season of this plant is two to three weeks later than that of *A. laevigata*. The latter comes into flower in Connecticut about May 1st, or, in exceptional seasons, as early as April 15th and ceases flowering about June 1st. The other I have not been able to find in flower before May 15th and it is in full flower nearly or quite throughout the month of June.

After the observations noted above a question arose as to the identity of the original *Turritis laevigatus* Muhl. This seemed fairly plain from the description of Willdenow but to make the matter more certain Prof. M. L. Fernald kindly obtained for me a tracing of the type-specimen from Berlin. This shows a rather poor specimen, but one, which, with its sagittate-clasping stem-leaves, all undivided, and its obovate pilose radical leaves of the first year, is manifestly the same as the commoner plant which has been familiar as *Arabis laevigata*. I propose the other plant discussed above as

Arabis **viridis** n. sp. Planta 2–6 dm. alta, simplex vel paulo ramosa, foliosa, viridis, glabra; foliis radicalibus lanceolato-spatulatis, dentatis

vel lyratis, petiolatis, 2–5 cm. longis, caulinis inferioribus lyratis, mediis dentatis, superioribus minoribus integris, caulinis omnibus sessilibus non amplexicaulibus; floribus racemosis; pedicellis plerumque erectis; petalis albis, 6–8 mm. longis, calycem superantibus; sepalis linearibus vel oblongis, obtusis, 4–5 mm. longis; siliquis junioribus erectis flores superantibus, maturis falcato-recurvatis, 6–9 cm. longis, circa 1.5 mm. latis; seminibus marginatis, quadratis, 1.5–1.8 mm. longis, circa 1 mm. latis.

Plant 2–6 dm. tall, simple or somewhat branched, leafy, green and glabrous; radical leaves lanceolate-spatulate, dentate or lyrate-pinnatifid, petioled, 2–5 cm. long, lower cauline leaves lyrate-pinnatifid, those on the middle of the stem dentate, the upper smaller and entire, all the cauline leaves sessile but not clasping; flowers racemed; pedicels nearly erect; petals white, 6–8 mm. long, exceeding the calyx; sepals linear or oblong, obtuse, 4–5 mm. long; young pods erect, overtopping the flowers, falcate-recurved when mature, 6–9 cm. long, about 1.5 mm. wide; seeds quadrate, margined, 1.5–1.8 mm. long, about 1 mm. wide.

MAINE: South Berwick, June 13 & 14, 1896, *J. C. Parlin* and *M. L. Fernald*; Berwick, July 21, 1898, *J. C. Parlin*. MASSACHUSETTS: wet cliff at Cascade, Melrose, June 5 & 11, *W. P. Rich*; Barry's Woods, Jamaica Plain, June, 1879, *C. E. Faxon*; Medford, July 8, 1885, *C. W. Swan*; Medford, May 31, 1896, *F. S. Collins*; Cascade, Middlesex Fells, June 7, 1900, *J. R. Churchill*; ledges, base of Bearberry Hill, West Roxbury, July 12, 1902, *F. G. Floyd*. CONNECTICUT: dry soil on trap ledge, Southbury, May 16, June 12 and July 25, 1909, *E. B. Harger*, No. 5322 (type-specimen in Gray Herbarium); Bolton, 1907, *C. A. Weatherby*; Talcott Mt., West Hartford, 1896, *H. S. Clark*; and same locality 1898, *A. W. Driggs*; Wethersfield, *C. Wright*; trap cliff by Farmington River, East Granby, July 5, 1909, *E. B. Harger*; Mt. Carmel, Hamden, 1908, *A. E. Blewitt*.

Thanks are due Prof. M. L. Fernald for his assistance in procuring information regarding type-specimens and in other ways and to Mr. C. A. Weatherby for help with bibliographical work.

OXFORD, CONNECTICUT.

NOTES ON CONNECTICUT MOSSES,— II.

G. E. Nichols.

During the past year the number of mosses known to occur in Connecticut has been very considerably increased. As will be seen from the remarks in the body of the present paper these additions are due partly to a more critical examination of material already at hand. But the majority are the result of recent collections. The region about Salisbury has proven especially fruitful, and will repay more thorough exploration. Salisbury is situated in the northwestern corner of Connecticut and, in addition to including the highest elevations, it contains one of the few, and perhaps the richest of the limestone areas in the state. There are many localities in this town which are of particular interest to a bryologist. Among these are Bingham Swamp, a typical mountain Sphagnum bog with its central pond and enveloping spruce forest; Bear Mountain, altitude 2350 feet, together with the adjacent rocky slopes and brook beds; Sage's Ravine; the region below the falls of the Housatonic River at Falls Village; the "Wolf Den," a moist limestone ravine; Beaver Dam Swamp, an extensive, well wooded, calcareous area; and the marly swamps bordering the Twin Lakes. Up to the present writing no less than eighteen species of hepatics and mosses are known from no stations in the state outside of Salisbury. Another locality worthy of mention is the Chamaecyparis swamp at Stafford, which is unusually rich in northern forms and affords the only known Connecticut station for a number of interesting species.

The ten species discussed on the following pages are all new to Connecticut. One is new to New England.

Dicranum sabuletorum Ren. & Card. (*D. pallidum* Br. & Sch., not C. Müll. *D. spurium* var. *condensatum* Lesq. & James, not *D. condensatum* Hedw.) On a rock near the shore, New Haven (J. A. Allen, 1881). Determined by Prof. O. D. Allen, and verified by Dr. A. J. Grout. Recorded also from Maine (Rand), and Massachusetts (Miss Clarke, *fide* Grout). By some authors this species has been considered merely a variety of *D. spurium*, and Allen's specimens are cited under this name in the Bryophytes of Connecticut.[1] Al-

[1] Evans, A. W., and Nichols, G. E. Conn. Geol. and Nat. Hist. Surv. Bull. **11**. 100. 1908.

though recognized by Bruch and Schimper [1] and the Lesquereux and James Manual [2] the first full account of this plant is given by Renauld and Cardot.[3] These authors show that the name *D. condensatum* Hedw., by which the species has frequently been designated, cannot be retained, since upon examination the material on which Hedwig's observations [4] were based was found to consist of three distinct species: *D. scoparium* forma, *D. Muhlenbeckii* (?), and *D. sabuletorum*. Both his description and figures, however, apply to the two species first mentioned, and not at all to the last. It is obvious that Hedwig had at best but a vague idea of the present species. Bruch and Schimper, in an incidental note, mention "*D. pallidum*" as a species closely resembling *D. Muhlenbeckii*, but no description is given. *D. sabuletorum* differs from *D. spurium* principally in its narrower leaves, which are smooth or only slightly papillose and not undulate. It ranges from Newfoundland and Ontario to the Gulf States, being more common southward. Although usually restricted to low, sandy coastal regions, it has been collected as far inland as Wisconsin (True) and Missouri (Bush). The spores mature in spring.

Dicranum Muhlenbeckii Br. & Sch. On rocks, earth, and old logs, usually in elevated regions. Collected on West Rock, New Haven, by Prof. O. D. Allen (1879). Determined by Dr. A. J. Grout. Known also from Vermont (Eggleston). As already noted, this species bears a strong likeness to *D. sabuletorum*. Both grow in more or less compact tufts. *D. Muhlenbeckii* may be distinguished by the less strongly porose walls of the upper leaf cells and the smooth leaves, as well as by the season of fruiting — the spores mature in August or September. The West Rock specimens are sterile, but it fruits copiously in certain localities. It is widely distributed throughout northern North America, from Quebec to Yukon Territory, extending south to Alabama and New Mexico; more common westward; Europe; Asia.

The only Connecticut *Dicranum* thus far recorded with which the two species above listed might be confused is *D. scoparium*. In this species the leaves are usually secund and the upper leaf cells are elongated, while in both *D. sabuletorum* and *D. Muhlenbeckii* the leaves are

[1] Bryologia Europea **1**: 39. 1836–1851.

[2] Mosses of North America. 76. 1884.

[3] Bot. Gaz. **14** : 91, 92. *pl. 12 A*. 1889; Rev. Bryol. **16** : 10, 11. 1889. See also Cardot, Bull. Herb. Boissier **7** : 308–311. 1899.

[4] Species Muscorum **1** : 139. *pl. 34*. 1801.

equally spreading and the upper leaf cells are approximately isodiametric.

Dicranum Drummondii C. Müll. On the ground in a mountain spruce swamp, altitude 1900 feet, Salisbury (G. E. N., 1910). Has been collected also in Maine (J. A. Allen, etc.), New Hampshire (D. C. Eaton), and Massachusetts (E. Faxon). *D. Drummondii* bears a superficial resemblance to *D. undulatum* and is doubtless often wrongly referred to that species. The two grow in similar localities. In *D. undulatum*, however, the leaves are equally spreading or only slightly secund, and the upper leaf cells are considerably elongated with porose walls. In *D. Drummondii* the leaves are strongly falcate-secund, and the upper leaf cells are mostly quadrate with non-porose walls. This species ranges from Prince Edward Island to New Jersey, and westward to the eastern slopes of the Rocky Mountains; more abundant eastward. The capsules mature in summer.

Dicranum viride (Sull. & Lesq.) Lindb. On a fallen log in a white cedar swamp, altitude 700 feet, Stafford (G. E. N., 1910). Reported from all of the New England states except Rhode Island. Although it almost never produces fruit, *D. viride* is able to multiply rapidly by means of "Bruchblätter." The plants occur in loose tufts, their leaves spreading out straight and stiff in all directions from the stem. During the growing season the younger leaves ordinarily remain intact, but a light touch of the finger is sufficient to cause their slender, brittle apices to break squarely off. Under natural conditions the breaking off is doubtless effected through the agency of animals, or by the fall of leaves, twigs, heavy drops of rain, and snow. This peculiarity, which is shared by no other eastern *Dicranum*,[1] is a character by which the species may be easily recognized. The habitat given above is typical. In general it should be looked for in deep, moist woods, on the trunks and bases of trees, or on logs. The writer has occasionally observed it growing upon non-calcareous rocks. In eastern North America *D. viride* ranges from Newfoundland to Georgia and Minnesota. It is also reported from Alberta and Washington, and is common to both Europe and Asia. Accord-

[1] According to Limpricht (Laubmoose **1**: 370. 1890) *D. fulvum* likewise has brittle leaves. Correns (Vermehrung d. Laubm. 17. 1899), however, is unable to confirm Limpricht's observations to any marked extent on fresh material, although he finds occasional broken leaves, especially in the older parts of the plant.

ing to True [1] it seems to be replaced in the West by *D. strictum* Schleich.

Funaria flavicans Michx. Grassy ground along a brook, Glastonbury (Miss Frances Wilson, 1892). The writer's determination has been verified by Mr. R. S. Williams. New to New England. It is not always easy to differentiate between this species and the common *F. hygrometrica*. Mr. Williams [2] states that it may be distinguished "by the average smaller size, erect pedicel, more pointed leaves, as well as the less furrowed capsule, which matures a week or two earlier — in June — than in *F. hygrometrica*." *F. flavicans* is an essentially southern species. It has been collected in practically all of the states bordering on the coast from Connecticut to Florida, and ranges westward to Wyoming, Utah, and Arizona. The present station represents an extension in its known distribution northward of about fifty, eastward of about one hundred miles.

Racomitrium fasciculare (Schrad.) Brid. Steep, gneissoid rocks in the bed of a mountain brook, altitude 2000 feet, Salisbury (G. E. N., 1910). Recorded from all of the New England States except Rhode Island. In this case it grows associated with *R. aciculare,* our only other Connecticut species of the genus. In the field it is easily separated from this by its more prostrate habit, dirty, yellowish green color, and the more slender branches beset with numerous very short lateral branchlets. *R. fasciculare* is distributed throughout northern North America, extending south to Virginia, Minnesota, and Montana; Europe; Asia. The capsules ripen in spring.

Leskea gracilescens Hedw. On decaying wood, tree trunks, stones, and the ground. Woodbury (Eaton), Putnam (A. H. Graves and E. C. Miller), Hamden (O. D. Allen), New Haven (Kleeberger, 1874), North Haven (G. E. N.), New London (Spaulding). The North American species of *Leskea* have been carefully revised by Dr. G. N. Best [3] to whom the writer is greatly indebted for the determination of a large amount of Connecticut material of this genus recently submitted to him for examination. The majority of the specimens quoted above have heretofore been included under either *L. obscura* [4] or *L. polycarpa*. According to Dr. Best *L. gracilescens* is also known from Vermont and Massachusetts and is doubtless quite common in the southern portion of New England. This species is

[1] Bryologist **2** : 26. 1899. [2] Bryologist **4** : 9, 10. 1901.

[3] Bull. Torr. Bot. Club **30** : 463–482. *pls. 15, 16.* 1903.

[4] Connecticut material distributed under this name by Grout, N. Amer. Musci Pleuro. Exsic., No. 331, should be referred to *L. gracilescens* (*fide* Best).

intermediate between *L. polycarpa* and *L. obscura*, in some of its forms approaching the former, in others the latter, but can hardly be included under either as a variety. From *L. polycarpa*, according to Best, "it differs by its smaller, straight leaves which are shorter and comparatively broader, usually gradually acute and blunt pointed, and by its shorter, often imperfect segments." From *L. obscura* it may be distinguished by its thinner-textured, symmetric leaves which are lightly biplicate and often revolute at the margins. It is widely distributed, ranging throughout the United States east of the Rocky Mountains, but is rare in Canada and in the Southern States. The spores mature in summer.

Amblystegium vacillans Sull. Attached to rocks, usually submerged, in a rapid brook, Hamden (1909) and New Haven[1] (G. E. N.). Determination confirmed by Dr. Grout. The type locality for this species is the White mountains, New Hampshire, where it was collected by Oakes. It is also recorded from Vermont (Grout). *A. vacillans* has the habit and general appearance of *A. riparium* to which it is closely related. It may be identified by the usually obtuse tips of the leaves, which have short, frequently irregular cells in the apical region. The range of this species is certainly more extensive than the small number of localities from which it has been reported would seem to indicate. Outside of New England it is definitely known only from Ontario and New Jersey. Doubtless, as in the present case, it is often collected for *A. riparium* and not examined with sufficient care. The writer ventures the opinion that if all herbarium material bearing the label "*A. riparium*" be reëxamined our knowledge concerning the distribution of *A. vacillans* will be considerably increased. Since it usually seems to be regarded as a subalpine plant it is of interest to note that the New Haven station is less than ten feet above tide water.

Calliergon trifarium (Web. F. & Mohr) Kindb. Partly submerged in an open, marly swamp at the margin of Twin Lakes, altitude 750 feet, Salisbury[2] (G. E. N., 1910). The only New England station previously described is at Crystal, Aroostook County, Maine, where it was collected by Prof. and Mrs. M. L. Fernald.[3] This moss

[1] Material from this station has been supplied to Dr. Grout for distribution in N. Amer. Musci Pleuro. Exsic.

[2] Distributed by Grout, N. Amer. Musci Pleuro. Exsic., No. 350.

[3] See Collins, Rhodora **10** : 37, 38. 1908.

is of peculiar interest since, notwithstanding its relatively large size and distinctive appearance, it has been very infrequently collected on this continent. Aside from the two stations noted the only American localities from which it is known are the Gaspé peninsula, Quebec (J. F. Collins), the region bordering Lakes Huron and Ontario — in Bruce and Prince Edward Counties, Ontario (Macoun) and near Sandusky, Ohio (Lesquereux) —, and British Columbia (Macoun). It also occurs in Greenland and is widely distributed in northern Europe and Asia. Its apparent rarity in North America may be ascribed partly to the fact already suggested by Collins that the plants seldom form large mats, but usually occur singly or in small tufts intermixed with other species. In the Salisbury station, however, although associated with other mosses, *C. trifarium* forms almost pure colonies of considerable size. It seems very probable that this is one of those forms like *Anacamptodon splachnoides* which, although widely scattered, is of extremely local occurrence. The frequent association of *C. trifarium* with *Drepanocladus scorpioides* has been referred to by Warnstorf [1] and Collins. In the present station also these two species grow together, forming loose mats in the wetter parts of the swamp amid a rank growth of sedges. The only other companion moss in the immediate vicinity is *Chrysohypnum protensum*. The Sphagnums are conspicuous by their absence.

Since *Calliergon trifarium* is not referred to in Grout's recent Manual,[2] a brief description is here given. The moss resembles somewhat a very robust *Philonotis*. The plants are golden-yellow above and glossy when dry, dark brown below. Stem rigid, erect or prostrate, simple or very sparingly branched, often 10–15 cm. or more in length. Leaves loosely imbricated, very concave, broadly ovate to suborbicular, entire, and very obtuse; nerve slender, usually simple and disappearing above the middle, rarely short and double; basal cells large, mostly hyaline, and not forming a sharply defined group at the angles. Dioicous. Fruit rare, maturing in early summer.

Drepanocladus scorpioides (L.) Warnst. With the preceding, Salisbury [3] (G. E. N., 1910). Reported also from Maine (Fernald), New Hampshire (Miss Lorenz), and Vermont (E. Faxon). This is

[1] Kryptogamenfl. d. Mark Brandenburg 2: 988. 1906.
[2] Mosses with Hand Lens and Microscope. New York. 1903–1910.
[3] Distributed by Grout, N. Amer. Musci Pleuro. Exsic., No. 349.

one of the largest of the hypnoid mosses and is not likely to be mistaken for any other species. It ranges throughout northern North America, extending south to northern Connecticut and Ohio, Michigan, and Montana; Greenland; Europe; Asia. Fruit rare, maturing in summer.

In a previous paper [1] the writer has discussed the occurrence of *Philonotis caespitosa* in this state. Recently there has appeared Dismier's revision of the American species of the genus [2] in which two new varieties of this variable species are described,— var. *compacta* and var. *heterophylla*. The former is quoted from Connecticut only — Hamden and Ledyard (G. E. N.). No localities are given for var. *heterophylla*. It should be cited from Connecticut — Huntington (G. E. N.) — and Colorado (Holzinger). Var. *laxa* (Warnst.) Loeske & Warnst. is also credited to Connecticut — Easton (Eames).

The following additional localities for species heretofore recorded from but one Connecticut station should be noted: *Nanomitrium Austini*, Windsor and Stafford (G. E. N.); *Barbula fallax*, North Haven [3] (G. E. N.); *Orthotrichum pumilum*, Vernon (Miss Lorenz); *Pterigynandrum filiforme*, Meriden and Woodbridge (G. E. N.); *Camptothecium nitens*, Brookfield (A. W. Evans and Miss Lorenz); *Rhytidiadelphus squarrosus*, Stafford (G. E. N.); *Polytrichum alpinum*, Stafford (G. E. N.); *Polytrichum strictum*, Putnam (A. H. Graves and E. C. Miller).

Two incidental observations may be of interest, since they concern Connecticut species. The first has to do with the habitat of *Drummondia clavellata*. Ordinarily this is regarded as a form which grows exclusively on the bark of trees. Consequently the writer was quite surprised during the past spring to find a mat of this plant flourishing luxuriantly on a dry limestone bowlder in an old stone wall. The second note concerns the distribution of *Anacamptodon splachnoides*. Until recently this moss has not been reported north of Maine. It was collected, however, by the writer in the summer of 1909 near Indian Brook, Cape Breton Island, Nova Scotia — a little patch no larger than a five cent piece, in full fruit, growing in a knot-hole of *Betula lutea*.

Yale University.

[1] Rhodora **12**: 152. 1910.
[2] Bull. Soc. Bot. France, Mem. **17**: 1–37. 1910.
[3] Distributed by Holzinger, Musci Acro. Bor.-Amer. Exsic., No. 254.

THE VARIATIONS OF LATHYRUS PALUSTRIS IN EASTERN AMERICA.

M. L. Fernald.

The circumpolar *Lathyrus palustris* L. has long been very perplexing to the student of systematic and geographic botany. As represented in many regions it occurs in two or more forms which by some authors have been treated as varieties, by others as distinct species. Torrey & Gray, for instance, recognized in America seven pronounced variations of *L. palustris,* besides *L. myrtifolius* Muhl. which was afterward treated, by Dr. Gray at least, as a variety of *L. palustris*.

In eastern America there are three primary variations of *L. palustris*. One, a plant of comparatively coarse habit, varies from 5 (rarely only 3)–12, averaging 7 dm. in height, has coarse glabrous ordinarily more or less winged stems, excluding the wings 1.5–3 (averaging 1.8) mm. in diameter below the lowest peduncle; 2–5 pairs of elliptic to broadly lanceolate or oblanceolate glabrous leaflets 3–8.5 cm. long, and 3–5 (rarely 8) large purple flowers 1.6–2.5 cm. long. This plant in its chief characters matches Old World material of *L. palustris* and is the form taken by Seringe, Reichenbach, Rouy & Foucaud, Ascherson & Graebner, and other critical students of the European flora as true *L. palustris* (var. *genuinus* Grenier & Godron; var. *latifolius* Lambertye).

The second striking variation of *L. palustris* is a much smaller plant with the low glabrous slightly winged or wingless stems 1–6 (rarely 8) dm., averaging 3.7 dm., high, and below the lowest peduncle only 0.5–1.5 (average 0.9) mm. in diameter. This plant has ordinarily 2 or 3 (rarely 4 or 5) pairs of linear or lanceolate glabrous leaflets, and its 2–5 flowers are about 1.5 cm. long. This, as shown by comparison with Seringe's material in the DeCandolle Herbarium at Geneva, is *L. palustris,* var. *linearifolius* Seringe (*L. viciaeformis* Wallr.).

The third primary variation of *L. palustris* is var. *myrtifolius* (Muhl.) Gray, by some authors treated as a species, *L. myrtifolius* Muhl. In this extreme the stems are as slender as in var. *linearifolius* and commonly wingless, but as tall as in typical *L. palustris*; the 2 or 3 pairs of elliptical to broadly lanceolate leaflets are mostly

2–4 cm. long; and the 3–9 flowers are as small as in var. *linearifolius* or even smaller (1–1.5 cm. long). Although var. *myrtifolius* is specifically separated by some authors from *L. palustris* by its wingless stems, shorter leaflets and smaller flowers, these are all characters which are so subject to variation that no one of them alone is constant enough for diagnostic use. The nearly wingless stem of var. *myrtifolius*, though a reasonably good character when taken in connection with the other points, occurs also in numerous specimens with the low stature and elongate linear-lanceolate leaflets of var. *linearifolius* and even in the coarser larger-flowered *L. palustris* itself. In fact, the pubescent extreme of the large-flowered *L. palustris*, which commonly has the stem somewhat winged, was treated by the late Theodore G. White in his *Revision of the Genus Lathyrus*[1] as a variety of the "wingless"-stemmed *L. myrtifolius*, his *L. myrtifolius macranthus*, having the "flowers large (2–2.5 cm. long)" and thus clearly opposed to the statement in his key that *L. myrtifolius* has the "flowers less than 1–5 [1.5] cm. long."

Not only do the flowers vary in size and the stems in stoutness and the degree to which the wings are developed, but the number, outline, and length of the leaflets are perplexingly variable, so that, as already stated, no one of these characters can be relied upon to distinguish *L. myrtifolius* as a species; but an examination of nearly 200 American specimens of the group has shown that, though none of these characters can be taken as final, they do occur in combinations which taken together mark off some very well defined varieties. Three of these varieties are characterized above. A fourth, var. *pilosus* (Cham.) Ledeb. was taken up in the 7th edition of Gray's Manual as a plant resembling typical *L. palustris* in stature, foliage, and large flowers, but differing in being pubescent. This large-flowered plant with large usually broad leaflets, the *L. myrtifolius*, var. *macranthus* of White, was identified during the revision of the Manual by comparison with Asiatic material labeled *L. palustris*, var. *pilosus* and with the figure so called in Reichenbach's *Icones Florae Germanicae* (xxii. t. mmcclvii, fig. v). But subsequently a difficulty has arisen through the discovery that much of the plant referred in the Manual to var. *linearifolius* is quite as pilose as the coarser plant taken to be var. *pilosus*; and examination of the original description of *L. pilosus*

[1] T. G. White, Bull. Torr. Bot. Cl. xxi. 444–458 (1894).

Chamisso, upon which Ledebour based his var. *pilosus,* shows that he had, not the plant with broad leaflets which has been generally identified with var. *pilosus,* but the pubescent extreme of var. *linearifolius.* Chamisso's description reads:

"LATHYRUS PILOSUS n. sp. Proximus *palustri,* gracilior tenuiorque, et omnium partium, praeter corollas glabras et forse legumen deficiens, pilositate diversus.— Pilosus, caule gracili tetragono bialato ad nodos haud flexuoso, foliis 2–4-jugis, foliolis linearibus," etc.[1]

Chamisso's plant was from "portum Petro-Pauli Kamtschatcae," and it is interesting to find that material from Petropaulovskii, Kamchatka, and from Amur, Manchuria and Japan differs consistently from the European var. *linearifolius* in being pubescent, and that this pubescent Kamchatkan plant extends across to Alaska and down the Pacific coast at least to Oregon. On the Atlantic coast it is the common slender plant of meadows and damp or even dry situations (often brackish) from Labrador to Connecticut.

The var. *linearifolius* as treated in the 7th edition of Gray's Manual contained not only the slender pubescent plant with linear or lanceolate leaves (the plant just shown to be the true var. *pilosus*) but also a glabrous plant which, upon further comparison, the writer is unable to distinguish from the true glabrous var. *linearifolius* of Seringe. As represented in the Gray Herbarium, the glabrous var. *linearifolius* seems to be confined in America to the St. Lawrence Basin and adjacent territory, occurring from Minnesota and western Ontario to the vicinity of Quebec.

The large plant, which in the Manual is called var. *pilosus* and which has been passing both in Asia and Europe under that name, stands to typical *L. palustris* in the same relation as does true var. *pilosus* to var. *linearifolius.* The large pubescent plant is as tall and coarse as true *L. palustris,* has similar foliage and large flowers and differs from it only in the pubescent stems, leaves, calyx, and pods. This was the *L. palustris* η of Torrey & Gray, recently redescribed as *L. myrtifolius macranthus* White, from Lubeç, Maine. In Mr. White's characterization emphasis is put upon the wingless stem, but this character is not a constant one, as shown by other pubescent plants with broad leaflets and large flowers from the coast of Maine and the Maritime Provinces. This large plant, Mr. White's *L. myrtifolius*

[1] Cham. Linnaea, vi. 548 (1831).

macranthus, is frequent in rich gravelly thickets along the coast from the lower St. Lawrence and western Newfoundland to York County, Maine, extending up the St. Lawrence system to Michigan; and, like var. *pilosus*, it reappears on the Pacific coast from Oregon to Alaska, crossing thence to eastern Asia, where it occurs at least in Amur, Manchuria, and Japan. In Germany an extreme of *L. palustris* has been reported under the name var. *pilosus* as "selten," but judging from the illustration given by Reichenbach the plant which reaches Germany is nearer the broad-leaved plant here under discussion, and, as far as the writer can find, this plant has no name except that given it by Mr. White under *L. myrtifolius*.

The conclusions reached in this study may be summarized in the following synopsis.

* Plant comparatively stout, the winged or sometimes wingless stem 5 (rarely only 3)–12 dm. high, excluding the wings 1.5–3 mm. in diameter below the lowest peduncle: the middle leaves with 2–5 pairs of elliptic to lanceolate or oblanceolate leaflets 3–8.5 cm. long and 7–23 mm. wide: peduncles 3–5 (rarely 8)–flowered: flowers 1.5–2.5 cm. long.

L. PALUSTRIS L. Stems, leaves, etc., glabrous.— Sp. Pl. 733 (1753). — Lower St. Lawrence River, Quebec, to Manitoba, south to York County, Maine, Lake Champlain, Vermont, northern and western New York, northern Ohio, Illinois, and Wisconsin; Oregon; also Eurasia. The following eastern specimens are considered typical. QUEBEC: St. Lawrence River, below Quebec, July 9, 1905, *J. R. Churchill.* MAINE: Van Buren, 1881, *Kate Furbish;* gravelly shore of Aroostook River, Fort Fairfield, Sept. 9, 1896, and Masardis, Sept. 8, 1897, *Fernald*; river-thicket, Presque Isle, July 14, 1902, *Williams, Collins and Fernald;* margin of Meduxnekeag River, Houlton, Aug. 12, 1909, *Fernald*, no. 1956; low thicket back of Wells Beach, July 22, 1898, *Kate Furbish*, July 23, 1898, *Fernald;* Ogunquit Beach, Wells, June, 1898, *Kate Furbish.* VERMONT: Garden Island, Lake Champlain, June 7, 1881, *E. & C. E. Faxon*; lake shore, North Hero, August 20, 1904, *E. Brainerd.* NEW YORK: Niagara Falls, 1821, Torr. & Gray Fl. OHIO: Huron River, Erie County, May 31, 1895, *E. L. Moseley.* WISCONSIN: Milwaukee, *Lapham.* ILLINOIS: Chicago, *Babcock.* ONTARIO: Michipicoten River, *Loring.* MANITOBA: Brandon, July 18, 1896, *J. Macoun*, no. 12,528.

Var. **macranthus** (T. G. White) n. comb. Similar, but stem, leaves, calyces and pods finely pubescent.— *L. palustris* η, Torr. & Gray, Fl. i. 276 (1838). *L. myrtifolius macranthus* T. G. White, Bull. Torr. Bot. Cl. xxi. 448 (1894). *L. palustris*, var. *pilosus* of various authors, not Ledeb.— Lower St. Lawrence River, Quebec, and western Newfoundland to York County, Maine, west chiefly along the

Great Lakes to Michigan; Alaska to Oregon; also eastern Asia and apparently rarely in Europe. Among the eastern American specimens examined the following are characteristic. NEWFOUNDLAND: Chimney Cove, north of Bay of Islands, 1893, *Waghorne*. QUEBEC: rich gravelly thicket by the River St. Lawrence, Rivière du Loup, August 3, 1902, *Williams & Fernald;* between Baldé and the Baie des Chaleurs, Bonaventure River, August 5–8, 1904, *Collins, Fernald & Pease.* NOVA SCOTIA: damp soil near edge of pond, near Pictou, July 12–18, 1901, *Howe & Lang*, no. 470; Sable Island, August 3, 1899, *J. Macoun*, no. 21,195. MAINE: Low ground, Cutler, July 3, 1902, *Kennedy* and others; Wells Beach, Wells, July 28, 1890, *Kate Furbish.* NEW YORK: edge of woods, Murray Island, Jefferson County, July 4, 1902, *Robinson & Maxon*, no. 95. MICHIGAN: near Alpena, July 13, 1895, *C. F. Wheeler.*

* * Plant comparatively slender, the winged or wingless stem 1–6 (very rarely 8) dm. high, 0.5–1.5 mm. in diameter below the lowest peduncle: the middle leaves with 2 or 3 (rarely 4 or 5) pairs of linear, lanceolate or narrowly oblong leaflets 2.5 (rarely only 1.5)–5.5 cm. long and 1.5–9 mm. wide: peduncles 2–5-flowered: flowers 1.3–1.8 cm. long. (Commonly well marked plants, but in their coarser and larger-leaved forms passing unquestionably to the members of the preceding and the following groups.)

Var. LINEARIFOLIUS Seringe. Stems, leaves, etc. glabrous.— Seringe in DC. Prodr. ii. 371 (1825). *L. viciaeformis* Wallr. Sched. Crit. 388 (1822).— Seen by the writer only from the St. Lawrence Basin and adjacent territory, and from Eurasia. The following American plants are characteristic. QUEBEC: vicinity of Montmorenci Falls, July 14, 1905, *J. Macoun*, no. 66,818. NEW YORK: northern New York, Torr. & Gray Fl. ONTARIO: Michipicoten River, *Loring.* MINNESOTA: Willmar, Kandiyohi County, July, 1892, *W. D. Frost.*

Var. PILOSUS (Cham.) Ledeb. Similar, but stems, leaves, calyces, and pods pubescent.— Fl. Ross. i. 686 (1842). *L. pilosus* Cham. Linnaea, vi. 548 (1831).—Meadows and swamps (often brackish) or even in dry situations, Labrador to Connecticut and probably slightly southward,[1] Alaska to Oregon; also Kamchatka and eastern Siberia to Amur and Japan. The following among many eastern American specimens are characteristic. LABRADOR: sandy barrens, Blanc Sablon, July 31, 1910, *Fernald & Wiegand*, no. 3645 (the most dwarf extreme, plants only 1–1.6 dm. high, the leaflets only 1.5–2.7 cm. long). NEWFOUNDLAND: gravelly shore, Port Saunders Harbor, August 6, 1910, grassy field overlying limestone rocks, Cow Head, July 22, 1910, *Fernald & Wiegand*, nos. 3644, 3643. QUEBEC: Seven Islands, Saguenay County, August 14, 1907, *C. B. Robinson*, no. 913; alluvial soil, mouth of Port Daniel River, July 30, 1902, seashore sands,

[1] It is probable that the Long Island *L. palustris*, which the writer has not seen, belongs to this common coastal variety.

New Carlisle, July 27, 1902, mouth of Bonaventure River, July 31, 1902, *Williams & Fernald.* Nova Scotia: island and intervale-meadow, Aspy Bay, Cape Breton Island, July 10 and 25, 1909, *J. R. Churchill*; Baddeck, Cape Breton Island, July 12, 1898, *J. Macoun*; Canso, July 11 and 27, 1901, *J. Fowler.* Maine: damp thicket near the sea, Moose Island, Passamaquoddy Bay, July 14, 1909, *Fernald*, no. 1959; Meadow, Pembroke, July 6, 1909, *Fernald*, No. 1955; in humus on rocky bank, Cutler, July 6, 1902, *Kennedy* and others. Massachusetts: Ipswich, *Wm. Oakes*; Topsfield, *C. N. S. Horner*; Cambridge, *Wm. Boott* and others; Dorchester, June 1, 1884, *J. R. Churchill*; dry open field, Polpis, Nantucket, June 3, 1900, *M. A. Day*, no. 52. Rhode Island: brackish meadow, Middletown, June 19, 1903, *B. L. Robinson.*

* * * Plant comparatively slender, the wingless or slightly winged stem 0.3–1 m. high, 0.7–1.5 mm. in diameter below the lowest peduncle; the leaves with 2 or 3 pairs of ovate, elliptical or broadly lanceolate leaflets 2–4 cm. long and 6–17 mm. wide: peduncles 3–9-flowered: flowers 1–1.5 cm. long.

Var. myrtifolius (Muhl.) Gray. Stem, leaves, etc. glabrous.— Man. ed. 2, 104 (1856). *L. myrtifolius* Muhl. in Willd. Sp. iii. 1091 (1803). *L. stipulaceus* Le Conte in Torr. Cat. Pl. N. Y. 92 (1819).— Quebec to Wisconsin, south to New Jersey, Pennsylvania, Ohio, and Indiana; and reported as occurring westward to Manitoba and south to North Carolina and Tennessee.[1] The following specimens are representative. Quebec: bank of St. Lawrence River below Quebec, July 9, 1905, *J. R. Churchill.* Ontario: Ottawa, August 10, 1894, *J. Macoun*, no. 4525. New York: swampy sandy pasture, border of Oneida Lake, Lenox, June 20, 1901, *J. V. Haberer*, no. 213; Seneca Lake, July 12, 1834, *A. Gray*; Penn Yan, *Sartwell*; Rochester, June 24, 1858, *Wm. Boott*; Niagara Falls, *Macrae.* New Jersey: Bergen County, 1862, *D. C. Eaton.* Ohio: Enterprise, Erie County, July 5, 1894, *E. L. Moseley.* Indiana: along Grand Calumet River, Miller, Lake County, June 29, 1897, *Agnes Chase.* Michigan: Port Huron, July 8, 1897, *C. K. Dodge.* Wisconsin: Milwaukee, *Lapham.*

Gray Herbarium.

[1] Mr. T. G. White included in the synonymy of *L. myrtifolius* in his *Revision of the Genus Lathyrus*, *L. altaicus* Ledeb. and *L. decaphyllus*, var. *minor* Hook. & Arn. There must have been some misinterpretation in the matter, for *L. altaicus*, a plant of the Altai Mts. of Siberia, was described by Ledebour "with leaflets pubescent beneath . . . peduncles 2–4-flowered . . . legumes densely villous-pubescent"; while *L. decaphyllus*, var. *minor*, coming from California, is apparently not referable to the eastern *L. palustris*, var. *myrtifolius.*

A DAY AT CONGAMOND LAKES.

C. H. Bissell.

One hot clear morning in September, Mr. R. W. Woodward and the writer took a train for Congamond, the little station near the Congamond Lakes which are entirely within the town of Southwick, Massachusetts, mostly in that curious little notch extending southward into what would naturally be Connecticut territory, and marking a relic of the boundary in colonial times. The lakes form a practically continuous strip of water, extending for about three miles in a north and south direction, and broken only by two roadways. The width is ordinarily from a quarter to a half mile, but the outlines are quite irregular. In former days the canal boats making the trip between Northampton and New Haven passed through these lakes, which supplied much of the water for the operation of the canal. The state boundary, on the east side of the notch just mentioned, follows the eastern shore of the lakes, so the land adjoining the lakes on that side for about two thirds of their length is in Connecticut, and it was this part that we planned to visit. The country here is a sandy plain, the general level of which is considerably higher than that of the lakes, and in many places this plain extends quite to the shore, forming a kind of sandy bluff. The water of the lakes is clear and blue and there is a fine view from these bluffs, westward across the lakes to the hills of Granby. The beauty of the spot is beginning to be appreciated and in some places many summer cottages fringe the edge of the wooded bluff.

Leaving the train, we followed the highway across the strip of Massachusetts, despised as far as our collecting was concerned, to the causeway, crossing which we were again on good Connecticut soil and ready for work. Turning to the right through an old pasture, we struck the lake and followed the sandy strand southward under a bluff of white and yellow sand. Along the strand were some of the sedges that delight in such a situation: *Cyperus dentatus*, mostly in the sterile form with leaves instead of scales; *Cyperus aristatus*, of which the fragrant specimens are a delight to handle in the herbarium, was occasional, while the dainty button-like tufts of *Hemicarpha* showed here and there on the sand. Before long the bluff ended and a long cove, stretching

back inland, blocked the way. Along the edge of the cove nothing of special interest appeared, but at its upper end, where it took a sharp turn and swung toward an arm of the lake, we found abundance of *Gaylussacia dumosa* — a shrub by no means common in this region — plentifully loaded with fruit. In the rather low old field or pasture, that bordered the end of the cove, was growing *Lycopodium obscurum*, var. *dendroideum*, a little of *L. clavatum*, and much more *L. clavatum*, var. *megastáchyon*. A curious variant of this last named variety was found in one colony. Here, mixed in with the normal form, which has spikes borne on long peduncles, were a few individuals with spikes entirely sessile or on very short peduncles, and plants were found having all these forms on the same stem.

Leaving the cove, we turned northward and soon struck a low sand beach on an arm of the lake, where we found *Panicum philadelphicum*. As we moved on, there soon appeared not far from the lake, but not visibly connected with it, a large sphagnum bog. This of course had to be explored, though we found some parts too soft and quaking to venture on. There were the usual plants of the sphagnum bogs of this region, *Picea mariana*, *Vaccinium corymbosum* and *macrocarpon*, *Kalmia angustifolia*, *Xyris caroliniana*, and *Carex trisperma*. The presence of *Andromeda glaucophylla* showed more of a rarity and we decided that this bog should sometime be visited earlier in the season in search of other good things. Leaving the bog, we had, under the trees on the bluff overlooking the lake, the pleasant change of lunch and a little rest after the swamp work. It was so comfortable here that it required an effort to leave, but the bog had taken time and we were far from our planned destination, the state line. We started northward along the lake, passing through sandy woods that here extend to the edge of the lake, with no strand. A little pond in the woods had about its edges *Ilex laevigata* in fine fruit. We soon found a cove that had to be passed by making a circuit inland. At the head of the cove we crossed a pretty, quick-flowing brook, full of *Elodea* in fine condition and covered with flowers. It was surely late in the season for such a state of the plant. We struck out now through the sandy country, with open woods and some barren places, thinking to find the state bounds, but we spent time over a collection of Lecheas of which we found several species growing together, and had finally to give up hunting for the boundary stone and turn back for the homeward tramp. It was along the highway this time and in a deserted

field that had not many years before been cultivated that we found an abundance of *Gnaphalium decurrens,* also more Lecheas. At last we were at the causeway again, and we made our way toward the station, stopping for a bite at the little lunch room that must find scant patronage so late in the season. The twilight shadows were falling as we took the train for home, tired, dusty, with full collecting boxes, after a day with the fields, the woods, the water, the sun and the sky. A tiresome and a useless day some might say, but to the friend of the great out-of-doors, one of the days looked forward to with anticipation, looked back upon with pleasure, and that go to make up a part in one of the durable satisfactions of life.

SOUTHINGTON, CONNECTICUT.

A SCIRPUS NEW TO NEW HAMPSHIRE.— Prof. Fernald has lately identified sheet no. 466 in my herbarium as *Scirpus rubrotinctus* var. *confertus* Fernald, although non-typical. The specimen, collected by myself in wet sphagnum at Sharon, Hillsboro County, New Hampshire, 17 July, 1909, not only adds a new name to the New Hampshire list but seems to afford the first New England record for the variety outside of Maine. The proximity of Sharon to the Massachusetts line suggests that the plant may yet be found in this state.— SIDNEY F. BLAKE, Stoughton, Massachusetts.

[*Scirpus rubrotinctus,* var. *confertus* was collected at Spectacle Pond, Wallingford, Vermont, July 30, 1901 (*W. W. Eggleston,* no. 2527) and in Southington, Connecticut, June 26, 1897 (*C. H. Bissell*). These specimens, recently deposited in the Gray Herbarium, indicate that the variety may be looked for throughout New England.—Ed.]

A NECESSARY CHANGE OF NAME.— Mr. C. E. Faxon of the Arnold Arboretum has called my attention to the fact that Dr. Focke, the well-known German rubiologist, used the word *amabilis* for the name of a rubus a very short time before I used it in 1906 for a plant quite abundant in the Kennebunks and North Berwick, Maine. See RHODORA VIII, 173 (1906). In Gray's New Manual it is mentioned but it is included under *Rubus Canadensis* L. However, my blackberry is not only an elegant and very distinct species differing greatly from

that species and varying but very little which is rare in a rubus, but it deserves to be kept distinct for what is perhaps the most important reason for recording a species — it is widely distributed.

In 1909, I found it in New Brunswick at St. Stephen near Calais, Maine, at Ingleside and Great Bay near St. John, and at Moncton and Painsec Junction thus crossing the province. In Nova Scotia I collected it around Yarmouth and it was very common (for blackberries) in the Annapolis Valley — at Digby, Middleton, Bridgetown and Kentville, and occurred in two places in Pictou. I now offer for a name

Rubus amicalis nov. nom. *R. amabilis* Blanchard, RHODORA VIII, 173 (1906).— W. H. BLANCHARD, Portsmouth, New Hampshire.

A CORRECTION REGARDING PROFESSOR PENHALLOW.— In my sketch of David Pearce Penhallow in RHODORA for January, 1911, I inadvertently omitted to insert the word Agricultural after the word Amherst in the 2d line of the last paragraph on page 2. Dr. Penhallow was graduated at the Massachusetts Agricultural College, not at Amherst College, both of which institutions are in Amherst, Massachusetts.— WALTER DEANE, Cambridge, Massachusetts.

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SOME FLESHY FUNGI OF STOW, MASSACHUSETTS.

Simon Davis.

At intervals during the past nine years, the writer has searched the town of Stow, Massachusetts, for species of the fleshy fungi. Stow is situated about 26 miles west of Boston and may be reached by the Fitchburg division of the Boston and Maine System. The township is large in area but small in population; the soil, except in the swamps, is largely gravel and sand; the surface is undulating and hilly with the exception of Boone's Plain which is level, sandy and gravelly with a stunted growth of pines and white birch. The vegetation is rather rich, woods of pine, oak, chestnut, birch and maple abounding, with elm, ash, hickory, spruce, hemlock, tamarack and cedar interspersed. All the swamps are infested with poisonous dogwood, *Rhus Vernix*, and poisonous ivy, *Rhus Toxicodendron*, is very abundant.

The largest swamp is least prolific in fleshy fungi owing to the thick coarse grass and some other cause that I cannot explain. All but the southwesterly part of the township furnishes good territory to search, and one piece of swampy ground, which I frequent, is usually very productive of pink-spored Agarics and rare species of *Amanita, Hygrophorus, Russula, Inocybe, Naucoria* and *Gomphidius.* Except in one locality, I seldom find a *Boletus* in any of the swamps; this place, however, until the past season, has always given me magnificent specimens of *B. spectabilis, clintonianus, eximius,* and *punctipes,* and *Boletinus paluster* and *cavipes.* The farmers of the town

are strongly opposed to trespassers, so much so that in 1906 I found it best to obtain express permission to search each piece of territory I hunted over, and I was requested to keep out of growing crops, newly plowed fields, and not to smoke — all reasonable requests.

The past season marked, I hope, the culmination of four successive dry seasons in Eastern Massachusetts. Yet the botanist should, after all, be grateful for such meteorological conditions, for they may be necessary to cause some fungi to fruit, that otherwise would not appear. Too much moisture usually produces premature decay, too much dryness induces immaturity in the species commonly met with in our wanderings.

I began search for fungi May 10 ult. and was much chagrined to find that Nature had anticipated me by bringing to maturity *Morchella esculenta* Pers. many days earlier than usual. Repeated efforts, however, were rewarded bountifully and my taste was gratified with several meals. At this time excellent and numerous specimens were found in all stages of growth, of *Entoloma clypeatum* L. (the dull yellow form), in an apple tree orchard and in identically the same situs where in 1909 I found *Omphalia pyxidata* Bull., an absurdly named fungus, as it seems to me. Between May 12 and October 30 ult. I collected at intervals Dr. Peck's species *Entoloma strictius*. I believe this species to be very variable in color and size and frequently productive of doubt as to its identity. Even Dr. Peck is puzzled at times as we may learn from this quotation taken from a personal note received last October: "On my trip to the Adirondacks in June I kept finding now and then in the sphagnous swamps an *Entoloma* which I did not recognize. It would occur one or two in a place, the pileus was generally conical or subcampanulate, varying somewhat in color but usually dark brown when moist and the whole plant was quite fragile. I was disposed to think I had a new thing, till I found in similar places a form with more convex pileus and decidedly umbonate, which connected very nicely with *E. strictius* and knocked the new species idea completely out of my head. The type of the species was collected in the fall but I now know from my own and others' experience that it may also occur in spring and summer, and that it is much more variable than I formerly supposed." In May I found no less than eight specimens of this species of large size growing from a common base. On the opposite side of the same swamp in mixed woods I found the largest individuals I have ever met with; they were

on the average twice as large as the type but corresponded with Dr. Peck's description in all essential characteristics.

Entoloma modestum Pk. was collected in its usual habitat in May and June and quite to my surprise, again on October 30. The autumnal form is somewhat smaller but differs in no other respect from the type.

During July and August I collected a small white *Hygrophorus*, and also a black one that was very variable in size and tint, both very viscid and strong smelling, the former slightly mephitic, the latter as soon as it begins to decay smelling of bad fish.

There are those who would probably refer the black species to *H. luridus* B. & C.; but who knows what *H. luridus* really is? Not the writer. The white plant is wholly concolorous and possesses more than ordinary interest for all mycologists, because Dr. W. W. Ford of Johns Hopkins Medical School, Baltimore, has found it poisonous to rabbits and guinea pigs. These two species of *Hygrophorus* were found growing with *H. laetus* (Pers.) Fr. The white plant upon drying loses all odor and becomes tawny; the black plant retains its color but loses its odor. *H. laetus*, as I find it, frequently has a mephitic odor. I think it quite probable that ultimately our black and our white plants will be declared to be only varietal forms of *H. laetus*.

On August 3 I found in its usual situs, in a chestnut grove, *Entoloma grande* Pk., a rare plant according to Dr. Peck, as he informed me in September. The plants were of average size, a little lighter in color than usual and few in number. I cannot help remarking the strong resemblance superficially between this plant and *E. sinuatum* Fr.; both species grow in this same locality not over 75 feet from where *E. clypeatum* was found. Although Dr. Peck originally thought that *E. grande* might be poisonous, he now, having tried it, pronounces it edible. (See Bull. N. Y. Mus. 139, p. 39–40.) Rolland also in his "Atlas des Champignons de France" p. 58, says that *E. clypeatum* "est comestible." I have found *E. grande* in this locality for six consecutive seasons and have sent fresh and dried specimens to Dr. Peck who has never hesitated to pronounce them *E. grande*. It is a distinguished looking plant belonging to the section *Genuina* of Peck's monograph of this genus. (See Bull. N. Y. Mus., 131, p. 48.)

About this time I began to find *Russula obscura* Rom. and *Russula palustris* Pk., the latter under tamaracks and pines in a swamp, the

former on low land adjoining a swamp under pines and deciduous trees; both are red plants. The only way I have been able to do anything with red *Russulae* is to study one species at a time under all conditions of growth. Until this season I have passed them by but with the advent of Peck's monograph and Dr. Kauffman's, I have plucked up sufficient courage to attack some of these species and I propose to continue the work. *R. obscura* is, generally speaking, larger than *R. palustris,* and the stem and flesh, especially the stem, become cinereous at maturity; the stem before maturity turns from white to cinereous if you handle it; handled roughly it becomes smoky brown, nearly black in some plants. *R. palustris* is slightly and tardily acrid to the taste, its pileus at maturity becomes broadly depressed, the depression shallow and saucer-like, and the color of the center is a dark blood red. The stem is white, delicately tinged with pink. Both species are usually infested with larvae. *R. obscura,* once known, is much more easily identified than *R. palustris* because of the changes in color of the flesh of pileus and stem.

Gomphidius roseus Fr. was found twice under pines in a swamp during the last ten days of July. My plants resembled very closely Michael's illustration No. 47, Part two.

Clavaria muscoides L. was found twice in August in a swamp under pines and deciduous trees in sphagnum. The species was identified by Dr. Peck. On this same trip I was very glad to find *Collybia strictipes* Pk.; it is well named because of its straight, tense appearance. The identification was by Dr. Peck.

Between August 23 and September 10 I found in two swampy localities numerous plants of what proved to be *Lepiota metulispora* B. & Br. Most of the plants grew from the vegetable humus covering the exposed and spreading roots of an enormous white oak. This fungus is remarkable for its peculiarly shaped spore which is described as nine-pin shaped, oblanceolate and obliquely clavate. The plant closely resembles *L. clypeolaria* Bull. in external character. Morgan says our American plant is considered a "form" of the Ceylon species.

On August 25 I collected two exceedingly interesting plants in my favorite swamp, *Amanita cariosa* (Fr.) Gill. and *Inocybe echinata* Roth, the former growing at the base of a large maple, the latter in sphagnum under a tamarack. The *Amanita* has apparently escaped the eyes of American mycologists until the past season; for I am credibly informed that it has never before been reported from America.

At first sight it reminded me of *Amanitopsis strangulata* (Fr.) Roze in color and size of pileus, and of *Lepiota procera* Scop. in annulus and stem. I quote the following description from Worthington G. Smith's "Synopsis of the British Basidiomycetes," p. 16: "*A. cariosa* Gill. (from the carious stem). *P.* soft, even, brown, whitish-brown, or dark-grey, unequally clad with thin, nearly white patches and clouds. *St.* fragile, somewhat enlarged below, white, pale umber and brown, scaly at base. *G.* adnate then seceding and free. Suspected poisonous. Woods. Sept. $4\frac{7}{8}' \times 5\frac{7}{8}' \times \frac{3}{4}'$. Closely allied to *A. spissa* Opiz."

The annulus of my plant was fixed, thin and dry. The exact description of my plant was drawn from the fresh specimen by Mr. L. C. C. Krieger of Cambridge, Mass., who determined the species. Mr. Krieger's notes are as follows: "Collected by Mr. Simon Davis in Stow, Massachusetts, August 25, 1910, in a tamarack swamp, at the foot of a maple.

Pileus 8 cm. broad, explanate, elevated at the very dark brown disk, paler toward the margin, moist and oily to the touch, smooth but covered with numerous, rather flat, grayish or light brownish woolly warts. The margin non-striate or very indistinctly short-striate. Flesh thick at the disk, thinning out toward the margin, dark brownish and watery.

Lamellae rather broad (9 mm.), tapering toward the stem, attached, moderately close, irregularly dimidiate, somewhat eroded on their edges, whitish when fresh, later on buff-colored and watery, becoming almost fluid and (on the application of moderate artificial heat) drying with excessive slowness into an agglutinated dark mass.

Stem 11 cm. long, terete, 1.9 cm. thick at the abruptly terminating, non-bulbous base, tapering toward the apex to a diameter of 9 mm.; pale dirty brown, almost white above, darker and more reddish brown below. The surface below the annulus covered with brown, downward-pointing and very loosely attached fibrillose squamules which are more conspicuous near the base; the surface above the annulus marked with horizontal zigzag broadish lines, indicating a rupture of the cortex. The very base of a brown ochre color, apparently stuffed, becoming hollow. *Flesh* watery, flaccid.

Annulus superior, cream-colored, medium size, spreading; margin frayed.

Volva absent at the base of the stem but present on the surface of the pileus, as described above.

Spores white, 6 × 9 μ, borne on basidia having but two sterigmata each."

Lepiota haematosperma Bull. (*Inocybe echinata* Roth.) has had a varied history in systematic Mycology. It has been placed in *Psalliota* on account of the color of the spores when fresh. Massee places it in *Inocybe*. But it is more satisfactory to have it placed in *Lepiota* on account of its almost or quite free gills and the pale yellow spores. See Quélet-Bataille Flore Monographique des Amanites et des Lépiotes, 1902, p. 73.

From the fresh plants I failed to get a spore print, but a microscopic examination of the spores of the dried plant showed them a pale yellow. My plants were small and very noticeable when first seen for the fringe-like appendiculate margin of the pileus, a character that disappeared before my return to the city. The plants, upon drying, have become jet black, as mentioned by Smith in the above named work. On this particular trip I was accompanied by Dr. W. W. Ford who was desirous of collecting all the poisonous species of *Amanita* we could find. There was a deer in the woods bent upon the same errand, and in football parlance it was *first down* for the deer, for the doctor having left his bag upon the ground and open, returned later only to find that its contents had been eaten, with what injurious effects, if any, we know not, though the doctor offered a substantial reward for the return of the deer, dead or alive, within 48 hours.

Russula abietina Pk., was collected at intervals during July and August; I had little difficulty identifying the plant and my determination was confirmed by Dr. Peck. My plants had an olive-green pileus with a brown or blackish center and were found in a swamp under pines and tamaracks and *not* under balsam fir as noted by Dr. Peck in his monograph upon the genus *Russula*. This is the second consecutive season I have collected this plant in this locality. It is an attractive plant but almost invariably riddled with larvae.

Early in July I found three plants of an interesting *Inocybe* which Dr. Peck considered to be *I. commixta* Bres., or near that species; see Bresadola, t. LVIII, f. 2. My plants were not so white as Bresadola's, but they were remarkable for the white floccose veil which was very apparent upon two of them. Quélet and Bresadola seem to think it a close relative of *I. geophylla* (Sow.) Fr. I hope to meet with this plant in the year to come in sufficient numbers to solve doubts about its identity. *Inocybe intricata* Pk. was scarce. In all I col-

lected but five plants, where usually the season gives me twenty-five or thirty. It affects swamps, and cannot be determined without the aid of a microscope. To me its two distinguishing features are its coarsely nodulose spores and grayish white gills.

Gomphidius gracilis B. & Br. and *Gomphidius maculatus* Fr. were both found in a swamp under pines in sphagnum and were much larger than in 1909 and also more typical. Berkeley's illustration of *G. gracilis* does not agree with his description. *G. vinicolor* Pk. suggests to me *G. gracilis* B. & Br.

On September 10 I found an interesting collection of *Entoloma rhodopolium* Fr. and *Entoloma nidorosum* Fr.; they grew together, gregariously, in a space of about 4 feet in diameter in a swamp wherein I find these species year after year. I picked in all about 40 specimens and placed them in two piles according to presence or absence of odor. About two hours elapsed before I reached home and when I opened the packages the odor had entirely evaporated from the plants I called *E. nidorosum.* I have done this same thing for three successive years with like results. I believe the difference between these two species, if any exists, should be confined to stature; *E. rhodopolium* being larger than *E. nidorosum.* Fries in *Hymenomycetes Europaei,* p. 196, says that *E. nidorosum* is "fragile with a strong alcaline odor; much thinner than *E. rhodopolium,* which is somewhat like it."

Tricholoma ustale Fr., or if not that plant then a plant belonging to that group, showed itself for the first time September 15, and continued in limited number for ten (10) weeks. The plants were smaller than usual. It grows in gravelly soil in sphagnum under scrub pines in company with *Hygrophorus hypothejus* Fr. and *Cantharellus dichotomus* Pk. Barla and Fries both give very good illustrations of this *Tricholoma* as I have found it for three successive seasons.

Hygrophorus laurae Morgan, *H. flavodiscus* Frost and *H. fuligineus* Frost were very scarce owing to the prevailing drought. I found a number of plants that had emerged from the ground only to dry up before maturity. I wonder how many know that *H. laurae* possesses the property of staining one's fingers as though dyed with sumach? Such is my experience.

A most interesting and very handsome *Polyporus* may be found occasionally upon old and decayed apple trees. It is *P. admirabilis* Pk. For description see Bulletin of the Torrey Botanical Club, 26,

p. 69, from which I quote the following: "This is a very beautiful and attractive species. . . . the fresh tufts of clear white trumpet shaped pilei are suggestive of a cluster of giant calla lilies." It is probably rare, as Mr. C. G. Lloyd writes me that he has never received it but from two correspondents. I quote the following from Mr. Lloyd's letter as it may interest those who are students of the *Polyporaceae*: "With regard to *Polyporus admirabilis* . . . . it is related to *P. squamosus* and belongs to the same section, for when well developed it has indications of a black base and rudimentary stipe. As a matter of relationship the plant is more closely related to *P. varius* of Europe than to any other species, having the very minute pores and hard context which are the characters of *P. varius*, and both of them opposed to the leading characters of *squamosus*. They all belong however to the section *Melanopus*, characterized by a black stipe."

Flammula betulina Pk. and *Naucoria firma* Pk. were both found in limited quantity and smaller in size than usual, in their regular habitats. Both grew in a grove of chestnut, the former upon decayed white birch logs, the latter upon both white birch and decayed chestnut limbs.

Hygrophorus coloratus Pk. was quite as abundant as usual and more highly colored; young plants were found with pilei entirely egg-yellow, and some entirely orange. It is certainly a very attractive plant in situ. I have found it for successive seasons in a swamp under pines, tamaracks and maples. It is an excellent mushroom to eat.

Clavaria pallescens Pk. was more abundant and larger in size than at any time since its discovery in 1908, when I first sent it to Dr. Peck. While it bears a strong resemblance to *C. ligula* Schaeff., Dr. Peck certainly advances good reasons for believing it a new and distinct species and has had abundant material upon which to base his opinion.

During October and November I found many plants of *Hygrophorus hypothejus* Fr., and I was particularly pleased to find the alleged variety "mendax" of Kalchbrenner. An illustration of this plant is given on Plate XXVII of Kalchbrenner's Icones. I firmly believe it is our duty to notice every departure from the type, but I fail to see any good result to be obtained from an attempt to lend undue importance to such a very slight variation from the type as "mendax" exhibits, and judging from the author's own words his conscience smote him before he concluded his work above named.

Apparently he was deceived by buttons that were cupola-shaped; "petasiformis" is his exact word; if he had waited for his buttons to develop he would never have tried to create such a mendacious variety. I found, however, a very curious departure from the type in a plant which was *entirely orange*. Fries notes this possibility in *Hymen. Europ.* and speaks of this species as changeable in color and variable in size, all of which I have observed since 1906. The plant is perfectly edible, fresh or dried.

Pluteolus callistus Pk., one plant only came to hand in August. It was not typical but was easily recognized by structure, color of spores in mass and habitat. I have collected a very few plants each season since 1907. I always find it in swamps growing from decayed maple or tamarack.

I believe it a very rare plant. When in good condition and fresh the pileus is a rich "Indian Yellow" with the center a bright deep yellow orange; stem pale citron yellow-above, duller below owing to a whitish or greyish pubescence which covers it; gills a dull pale ochraceous yellow, adnexed, and finely uneven on the edges as may be seen under a lens; flesh of both pileus and stem bright citron yellow. It will be noted that I have always found it on decayed, rotten wood and not in "exsiccated water holes in low swampy woods" as described by Dr. Peck. The determination was confirmed by Dr. Peck. I should add that the colors are transient.

In conclusion I beg to suggest to fellow students the wisdom of sticking to one locality. Dr. W. G. Farlow impressed this upon me some years ago, and I know from experience that his advice was correct. You can never exhaust one locality, probably, but whether you can or cannot, is not the point as I see it. Yearly observations, intelligently conducted, enable us to note any differences in species and consequently to check the multiplication of alleged new species that have no real claim to specific distinction.

Of the species mentioned in this paper specimens of the following have been sent to the New York State Herbarium at Albany, N. Y.: *Clavaria pallescens* Pk., *Collybia strictipes* Pk., *Entoloma grande* Pk., *E. modestum* Pk., *E. strictius* Pk., *Gomphidius vinicolor* Pk., *Hygrophorus coloratus* Pk., *H. flavodiscus* Frost, *H. fuligineus* Frost, *H. laurae* Morgan, *Inocybe commixta* Bres., *I. intricata* Pk., *Pluteolus callistus* Pk., *Polyporus admirabilis* Pk., *Russula abietina* Pk., *R. palustris* Pk., *Tricholoma ustale* Fr.

Specimens of the small white and small black *Hygrophorus*, of *Amanita cariosa* (Fr.) Gill., and of *Tricholoma ustale* Fr. were given to Dr. W. G. Farlow of Cambridge, Massachusetts.

Brookline, Massachusetts.

THE RECENT TREATMENT OF PANICUM COMPARED WITH THAT IN GRAY'S MANUAL.

Walter Deane.

During the revision of the genus Panicum in my Herbarium I have been making a most interesting comparison between the species and varieties treated in Gray's Manual, 7th ed., 1908 (in which the *Gramineae* were revised by Prof. A. S. Hitchcock) and the corresponding forms from the same geographic area as treated in the recent work by Prof. Hitchcock and Mrs. Agnes Chase, The North American Species of Panicum, published in Washington in 1910. In the latter work there are some changes in synonymy, several species and one variety have been added, and a few other changes have been made. These have been remarkably few considering the number of species involved and the extent of the area included. Careful search will doubtless disclose other species within our limits.

In the Gray's Manual there are 74 species (*P. tenue* Muhl. not being numbered) and 4 varieties of Panicum. In The North American Species of Panicum there are 91 species and 5 varieties recorded from the same region.

Mrs. Chase has suggested to me that the readers of Rhodora might be interested in these changes. I append a list, which has been kindly examined by Prof. Hitchcock and Mrs. Chase, including all additions, changes in synonymy, elimination of species, etc. Each species or variety is preceded by its number as occurring in Hitchcock and Chase's work. After additional species the Manual stations are given in which they occur, and also the natural group in which the species belongs.

	Treatment by Hitchcock and Chase, 1910.	Treatment in Gray's Manual, 7th edition, 1908.	Group (stated only in case of additions).
13	*P. adspersum* Trin. Ballast plant in Pennsylvania and New Jersey.	Omitted as not sufficiently established.	*Fasciculata.*
24	*P. barbipulvinatum* Nash. Illinois, Wisconsin and Minnesota.[1]		*Capillaria.*
44a	*P. virgatum cubense* Griseb.	*P. virgatum* L., var. *obtusum* Wood.	
46	*P. amarum* Ell.	*P. amaroides* Scribn. & Merr.	
47	*P. amarulum* Hitchc. & Chase.	*P. amarum* [but not of Ell.]	
56	*P. rhizomatum* Hitchc. & Chase. Virginia.		*Agrostoidia.*
62	*P. hians* Ell.	*Steinchisma hians* (Ell.) Nash.	
100	*P. calliphyllum* Ashe. Massachusetts, New York, Ohio. *P. Bicknellii* and this species are the only ones comprised in this group.		*Bicknelliana.*
103	*P. nitidum* Lam. Virginia, Missouri.		*Dichotoma.* "*Eudichotoma*" of Manual.
107	*P. Clutei* Nash. Massachusetts to Virginia	Included under *P. mattamuskeetense* Ashe.	
112	*P. roanokense* Ashe. Virginia.		*Dichotoma.*
113	*P. caerulescens* Hack. New Jersey, Virginia.		*Dichotoma.*
120	*P. wrightianum* Scribn. New Jersey.		*Spreta.*
122	*P. albemarlense* Ashe. Coastal Plain, Massachusetts to Virginia; Indiana, Michigan.	Included under *P. auburne* Ashe.	

[1] Localities are mentioned in this table merely to show occurrence, within the Manual limits, of species not hitherto recorded from the region. The changes of range indicated in the recent revision and relating to species already known from the Manual region are too numerous for record here. The subdivisions of the genus are closely similar in the two treatments. It may be noted that no. 148, *P. oricola* Hitchc. & Chase, placed in the Manual among the *Lanuginosa*, has been in the later treatment referred to the *Columbiana*.

136	*P. languidum* Hitchc. & Chase. Maine, Massachusetts, New York.		*Lanuginosa.*
138	*P. pseudopubescens* Nash.	*P. ovale* [but not of Elliott, whose plant is confined to the S. Atlantic and Gulf States].	
149a	*P. sphaerocarpon inflatum* (Scribn. & Smith) Hitchc. Maryland, Missouri.	Included under *P. sphaerocarpon* Ell.	
153	*P. albomarginatum* Nash.	*P. tenue* [but not of Muhlenberg, whose plant is confined to North Carolina and Florida.]	
169	*P. malacophyllum* Nash. Missouri.		*Oligosanthia.*
170	*P. helleri* Nash. Missouri.		*Oligosanthia.*
182	*P. cryptanthum* Ashe. New Jersey.		*Scoparia.*
186	*P. joorii* Vasey. Virginia.		*Commutata.*
192	*P. obtusum* H. B. K. Missouri.		
193	*P. hemitomon* Schult. [The last two are placed in miscellaneous ungrouped species].	*P. hemitomum* Schultes.	

Cambridge, Massachusetts.

OBSERVATIONS ON SOME PLANTS OF EASTERN CONNECTICUT.

R. W. Woodward.

The following notes refer, with a single exception, to plants from Franklin, a town in eastern Connecticut, about twenty miles north from Long Island Sound. All have been verified at the Gray Herbarium, and specimens of most of them have been deposited there.

Carex umbellata Schkuhr, var. *brevirostris* Boott. Toward the close

of April and in early May *C. umbellata* is common on the central hills of the town. A brief search will reveal its presence in any dry pasture. Two years ago I collected it from several fields, supposing that I had the species, and I was much surprised recently, on comparing the plant with specimens from the trap ridges about New Haven, to find that my Franklin specimens are all the variety *brevirostris*. While one cannot assume that the early Carex so abundant on the dry hills of Franklin consists wholly, or mainly, of this variety, yet the variety certainly grows in many places, and it seems worth while to record a station so far south of the ordinary range of the plant, which has been supposed to have its southern limit with us in Northern New England.

Carex debilis Rudgei × *virescens*. I collected this Carex in a dry pasture in Franklin in 1904, and have either collected or observed it at the same station every summer since. In 1910 I collected it in New Haven, where it was growing beside *C. virescens*, which had reached about the same stage of development at the time of the first collection in early June. In general aspect this hybrid at once suggests *C. debilis Rudgei*, and culms, sheaths and leaves are glabrous as in this species, or merely puberulent, especially the sheaths, but the spikes, which are shorter stalked, more erect, narrower, much more compact and with much shorter perigynia, than in *C. debilis Rudgei*, indicate the other parent. In the Franklin specimens, the glabrous, nerveless or faintly nerved, abruptly short beaked, oblong-elliptic perigynia are, on the average, 3.3 mm. long and 1.5 mm. broad. The perigynia of the New Haven plants are 0.3 mm. longer, and taper gradually to the beak, conforming in outline more to those of *C. debilis Rudgei*. In both plants the scales suggest the one parent in their tawny color, and the other in their acute or accuminate form. The New Haven plants showed great vigor, and were green and fresh and holding their fruit well on August 20, in spite of a dry location and an abnormally dry season — characters which point to *C. virescens*, it being a frequent experience of collectors to find this species growing on in full vigor after most other species of Carex have dried and cast their fruit.

Carex cephaloidea Dewey. So far as my experience goes, this species is seldom found in abundance at its stations, but there are several fields in Franklin, where it is an important constituent of the hay crop. In open, dry situations it is not always easy to recog-

nize, but in shade and along hedgerows, where conditions are more favorable it develops normally. These fields have not been ploughed and re-seeded in many years, and the Carex appears to be a permanent feature of the vegetation. I can certify that its relative proportions have not varied in five or six years.

Agrostis canina L. It is surprising how many experienced collectors have failed to find this Agrostis, and it is probably a rare species in New England. There is a fine station for it in Franklin, in a low lying sphagnous meadow.

Juncus effusus L. var. *conglomeratus* Engelm. This variety, which has been reported from only two or three stations in the United States, occurs in the same meadow. This is the station cited by Professors Fernald & Wiegand in their recent article on "The North American varieties of *Juncus effusus*," Rhodora **12**: 86.

Juncus effusus L. var. *compactus* Lejeune & Courtois. This is another product of the same attractive meadow. Mr. C. H. Bissell collected it here July 21, 1910.

Festuca rubra L. var. *subvillosa* Mert. & Koch. I have found this variety in dry, rather barren, hillside pastures, where it is associated with the species, and is not rare. Although it so closely resembles the species, it is not difficult to distinguish between the two in the field. It has not been reported from elsewhere in Connecticut. My first collection was made in 1904.

Artemisia annua L. has become a troublesome weed about one house, where it persists as an escape from an old garden.

New Haven, Connecticut.

Cynanchum nigrum in Barnstable, Massachusetts.— While I was taking a walk from Hyannis to Barnstable, July 14, 1910, I came across two large patches of a curious twining plant, with the pods of a milk-weed, and small, dark purple flowers. These stations, one on each side of the railroad track, were about a mile east from Barnstable court-house, beside an old and little-used highway. Examination showed the specimens to be *Cynanchum nigrum* (L.) Pers., an introduced plant from Europe, probably prized in the olden time for some not very obvious merit, officinal or ornamental.— Clarence H. Knowlton, Hingham, Massachusetts.

NOTES FROM MY HERBARIUM.

E. F. Williams.

During a recent examination of my herbarium Prof. Fernald noted some data which at his suggestion it seems desirable to put on record, and I therefore send them to Rhodora.

Potamogeton Vaseyi Robbins was collected in a bayou of the Connecticut river at Hanover, New Hampshire, in young fruit and with floating leaves on July 12, 1910. The fruiting form with floating leaves is given as rare in the 7th edition of Gray's Manual. It was abundant at this station.

Solidago macrophylla Pursh, var. *thyrsoidea* (Mey.) Fernald, collected July 30th, 1907, on Mt. Moosilauke, New Hampshire, a new station for New England for this mountain variety.

Artemisia pontica L. with fine flowering spikes, collected on old wharves at Portland, Maine, Aug. 3, 1910. This introduction from the Old World ought to be admitted to the Manual. I have it from Walpole, New Hampshire, collected July 28th, 1901, and Tewksbury, Massachusetts, collected September 24th, 1899, where the station is extensive and the plant at last accounts spreading. It has also been reported from other stations. This Portland station, however, is the first one to yield in my experience flowering specimens, all the other collections being of sterile plants.

Rosa rugosa Thunb. is also a claimant for admission to the Manual. I have collected it for several seasons on the beach at Middletown, Rhode Island, where it appears to be thoroughly at home. It is spreading notwithstanding very adverse conditions.

Antennaria neodioica Greene, var. *gaspensis* Fernald, new to the United States and to the Manual range, was collected by Prof. J. Franklin Collins and myself at Fort Kent, Maine, on July 22d, 1900. This plant was named by Mr. Fernald from specimens collected in July, 1905, at Tracadigash Point, Carleton, and on Mt. Ste. Anne, Percé, both stations in Gaspé peninsula, Province of Quebec, outside the Manual range. It will now have to be included in our flora.

Cambridge, Massachusetts.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—IX.

CYPERACEAE.

ELEOCHARIS.

E. acicularis (L.) R. & S. Swamps and muddy places by ponds and streams. Common from the Blue Hills north and west; doubtless throughout southern area, but not reported.

E. Engelmanni Steud. Sluice Pond, Lynn (*H. A. Young*, September, 1879); Pine Hill, Medford, Aug. 19, 1880 (*C. W. Swan*); wet sand and muddy shore, Winter Pond, Winchester (various collectors down to Sept. 15, 1906); in mud of shore, pond, Mill St., Westwood (*K. M. Wiegand*, July 23, 1908); gravelly shore, rather abundant, Reservoir, Wayland (*K. M. Wiegand*, July, 1908, no specimens taken).

E. Engelmanni Steud., var. **detonsa** Gray. Muddy and sandy shore, Winter Pond, Winchester (various collectors from Aug. 28, 1878, to October, 1908); "near Woburn" (*E. H. Hitchings*, 1878); Waltham (*B. D. Greene*).

E. interstincta (Vahl) R. & S. In water up to depth of four feet, Lake Waban, Wellesley (*T. Morong*, Aug. 13, 1883; *L. W. Riddle*, Sept. 19, 1906; *K. M. & M. C. Wiegand*, Sept. 19, 1907). Only station in the State.

E. obtusa (Willd.) Schultes. Muddy and wet sandy places, common throughout.

E. olivacea Torr. Wet sandy and muddy soil, occasional throughout. In Scituate this was found in a *brackish* bog back of a beach by E. F. Williams and W. P. Rich, Sept. 8, 1901.

E. ovata (Roth) R. & S. Wet places; Tewksbury, Winchester, Medford, Concord, Dedham, Sharon.

E. palustris (L.) R. & S. In water and wet meadows, abundant throughout.

E. palustris (L.) R. & S., var. **glaucescens** (Willd.) Gray. Occasional throughout.

E. quadrangulata (Michx.) R. & S. Shallow water, Lake Waban, Wellesley (*K. M. Wiegand*, July 20, 1908). Only station in the State.

E. Robbinsii Oakes. Shallow water, still or flowing; occasional in central and northwestern portion; to be looked for throughout.

E. rostellata[1] Torr. "Very common, on the salt marshes just at edge of upland, and also bordering the little island-like elevations of higher land on the marshes, in Salisbury, Newbury and Newburyport" (*R. Dodge*, Aug. 20, 1890); Medford (*Wm. Boott*, Aug. 16, 1865; *F. S. Collins*, June 19, 1887); Malden (*Wm. Boott*, July 19, 1853).

E. tenuis (Willd.) Schultes. Moist places; unrecorded from extreme southeastern part of district, but probably abundant throughout.

E. tuberculosa (Michx.) R. & S. Wet sandy soil; Gloucester, Manchester, Danvers, Tewksbury, Wilmington, Carlisle, Cambridge, Quincy, Milton, Weymouth, Norfolk; Bedford (*C. W. Swan*, according to Dame & Collins, Fl. Middlesex Co., 112, 1888).

STENOPHYLLUS.

S. capillaris (L.) Britton. Dry sandy soil, very common.

FIMBRISTYLIS.

F. Frankii Steud. Wet sandy and muddy shores. Apparently common, but not reported from southeastern portion of the district. In the Boston Soc. Nat. Hist. herbarium is a specimen collected by Francis Boott in 1822. On the label is the following statement: "Picked by Dr. Boott and given to me (B. D. Greene) 22d Nov., 1822."

C. H. Knowlton
J. A. Cushman
Walter Deane
A. K. Harrison
} *Committee on Local Flora.*

THE VARIETIES OF RIBES HIRTELLUM.

M. L. Fernald.

As recently pointed out by Coville and Britton,[2] the name *Ribes hirtellum* Michx. (or *Grossularia hirtella* (Michx.) Spach, the name used by those who see a sharp line of demarcation between the gooseberries and the currants) must be taken up for our common smooth-

[1] There is a sheet of *E. Robbinsii* in the Wellesley Coll. Herb. collected at Hammond's Pond, Newton, Sept. 8, 1854, by Wm. Boott. On the same sheet is mounted a specimen of *E. rostellata*, both species bearing the same label. There is probably a mixing of specimens here.

[2] N. A. Fl. xxii. pt. 3, 223, 225 (1908).

fruited gooseberry of the Northeast. *R. oxyacanthoides* L., with which our gooseberry has been confused, is, as shown by the above authors, a much more bristly shrub of the interior — from Hudson Bay and Lake Superior to the Rocky Mountains — with the stamens about equaling the petals and the leaves usually somewhat glandular, to which characters may be added the glandular-ciliate bracts. *R. hirtellum*, the common eastern shrub, has the fruiting canes almost never bristly above, the stamens distinctly exceeding the petals, and the leaf-surfaces and bracts without the glands which are characteristic of *R. oxyacanthoides*.

As shown in 1905,[1] the common eastern *Ribes hirtellum* (then confused with *R. oxyacanthoides*) has the leaves of the fruiting branches cuneate to cuneate-truncate at base and green and essentially glabrous or only slightly pilose along the nerves and margins beneath; while a more local extreme, *R. oxyacanthoides*, var. *calcicola* Fernald, at that time known only from highly calcareous habitats in eastern Quebec and from Michigan, but subsequently seen from Monhegan Island, Maine (*Miss M. P. Cook*), has the lower and sometimes the upper leaf-surfaces, the petioles and the young twigs permanently and densely white-tomentose, and the calyces hirtellous. The var. *calcicola* thus stands to the smooth-leaved *R. hirtellum* in a relation apparently similar to that of the local *Grossularia klamathensis* Coville[2] to *Ribes inerme* Rydb. (*Grossularia inermis* Coville & Britton), the common northwestern representative of our *R. hirtellum*.[3]

[1] Fernald, Rhodora, vii. 153–155 (1905).

[2] Coville in Coville & Britton, N. A. Fl. l. c. 224 (1908).

[3] *Grossularia klamathensis* is distinguished in the key from *G. inermis* by its having "leaf-blades villous on both surfaces, not glandular; hypanthium and sepals usually hirsute on the outside; berry black," yet the type description states that the hypanthium is "sparingly villous [not hirsute] or glabrous," while the leaves of *G. inermis* are said to be "glabrous or. . . . sometimes pubescent and glandular"; i. e. in either species the leaves may be pubescent; in each they may be glandless; and the hypanthium in *G. klamathensis* may or may not be pubescent. Judging by the ranges assigned the gooseberries, *G. inermis* is the only member of this immediate group which occurs in New Mexico, yet the New Mexican sheets before the writer have the leaves quite pilose to villous upon both surfaces (a key character of *G. klamathensis* of Oregon and northern California), two of the sheets (*Fendler*, no. 253 and *Heller*, no. 3772) have the hypanthium hirsute (*G. klamathensis* is distinguished from *G. inermis* by its "hirsute," i. e. "villous or glabrous" hypanthium), and the Fendler plant has plumose trichomes upon the petioles, which the writer supposes to be what are intended in the description of the Oregonian *G. klamathensis* by the "petioles. . . . often fibrillate toward the base." The occurrence of these characters in the Rocky Mountain *G. inermis* as well as the fact that the fruit of the smoothish plant is sometimes said to be black (*Cusick* in Gray Herb.) points to the probability that *G. klamathensis* is hardly a true species but better treated as an extreme variant of *G. inermis*.

In their treatment of the gooseberries Coville & Britton not only consider *Ribes oxyacanthoides*, var. *calcicola*, a plant with densely white-tomentose leaves and petioles, as identical with the "glabrous or sparingly pubescent" *Grossularia hirtella*; but reduce outright *Ribes saxosum* Hook., a plant with cordate leaves, although separating the thus constituted *G. hirtella* from the western plants which have "leaf-blades truncate to somewhat cordate at the base" by the key-character, "leaf-blades wedge-shaped at the base, except on an occasional aberrant plant," and thus indicating a belief that the cordate-leaved extreme of the northeastern plant is only an occasional aberration. To those, however, who are familiar with the flora of Newfoundland and eastern Canada, it is well known that the extreme variation of *R. hirtellum* with cordate or subcordate leaves on the fruiting branches is a very characteristic plant of certain areas, forming extensive colonies (as at Crabb's Point, Bay of Islands, Newfoundland; on the slopes of Cap Barré, Percé or on some of the sea-cliffs of Tourelle and Bic, Quebec) where its abundance indicates that it is a real phase of *R. hirtellum,* superficially so like the western *R. inerme* that it has more than once been identified with it: by Coville in publishing his *R. oxyacanthoides saxosum* (Hook.), which was based in part upon Hooker's description of the eastern plant, in part upon the western *R. inerme*; and by Robinson & Fernald who, in the 7th edition of Gray's Manual, indicated the var. *saxosum* as extending to the Rocky Mountains.

A recent study of the group, brought about by the receipt of true *Ribes oxyacanthoides* from northern Michigan, shows that the cordate-leaved *R. saxosum* Hook. is unquestionably an extreme of *R. hirtellum,* but that it can be separated from the western *R. inerme* (which also has cordate or subcordate leaves) only by the closest scrutiny. In the eastern plant the leaves are rarely quite glabrous but are usually a little pilose on the nerves beneath or on the margins; in the western frequently quite glabrous or with minute pubescence distributed over both surfaces; in the eastern plant the petioles commonly bear some long plumose frequently gland-tipped trichomes; in the western plant such plumose trichomes are unusual, though sometimes well developed, but the petioles generally (but not always) bear numerous sessile or subsessile glands; in the eastern plant the bracts of the raceme are glandless, though often pilose-margined, but in the western they are ordinarily glandular-ciliate. Whether or not the western

R. inerme can be maintained as a distinct species, there is no question that *R. saxosum* is distinct from it in several fairly marked characters.

The two varieties of the eastern *Ribes hirtellum* should bear the following names.

Ribes hirtellum Michx., var. **calcicola** (Fernald) n. comb. *R. oxycanthoides*, var. *calcicola* Fernald, Rhodora, vii. 155 (1905).

R. hirtellum, var. **saxosum** (Hook.) n. comb. *R. saxosum* Hook. Fl. Bor.-Am. i. 231 (1834). *R. oxyacanthoides saxosum* (Hook.) Coville, Contr. U. S. Nat. Herb. iv. 100 (1893) as to name-bringing synonym.

Gray Herbarium.

Ornithological Observations on Cleistogamy.— If anyone whose winter rambles lead him along wet wood borders will take note of clumps of *Panicum clandestinum* he will find the upper sheaths split to shreds while still uninjured at the junction with the dry and yellow blade above. A few winters ago the cause of this was made known to the writer when watching a flock of chickadees near Takoma Park, a suburb of Washington, D. C. These animated balls of gray and black were having a feast on the big fat grains of the cleistogamous spikelets concealed in the sheaths. I have since found occasional clumps of *Panicum boscii* also with shredded upper sheaths. Evidently the chickadees knew of this character of *P. clandestinum* and profited by it before Linnaeus bestowed the name "clandestinum" on the species because of it.— Agnes Chase, Bureau of Plant Industry, Washington, D. C.

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BOTANIZING IN CENTRAL CONNECTICUT.

Emma J. Thompson.

Eighteen years ago, when we first visited Pine Swamp, a grove of noble trees (*Pinus Strobus*) gave meaning to the name. These trees were cut half a dozen years or more ago, and though their absence changes the character of this region somewhat, still it is a place rich in possibilities for the botanist.

This particular Pine Swamp (we understand several other places in the state bear that name), is located in the towns of Cromwell and Rocky Hill, Connecticut, about a mile west of the Connecticut River. Its centre is a long, narrow, low-lying strip of sphagnum marsh, so level that the cold sluggish brook that drains it makes many long curves and loops. Here and there, in the more treacherous part of the bog, are a number of sunken places filled with dark, still water, each pool only a few feet in diameter and so regular in outline as to suggest it may have been cut out for some purpose of man. Stained black by the roots decaying moss and leaves, the water gives one the impression of mystery and infinite depth. Here the shrubs and young growth are so thick overhead, the weeds and ferns so rank beneath and the brook so twisting in its course, that one may wander for hours over the same few rods of ground, unless provided with a compass. Here in the heart of the swamp we find

Habenaria blephariglottis (Willd.) Torr., one of the most beautiful of its genus. A few of these plants have held this station for many years. Our first specimen was taken in 1894, and this past summer Mr. C. H. Bissell found a single plant.

Habenaria fimbriata (Ait.) R. Br. occurs frequently along the brook-side.

Corallorrhiza trifida Chatelain was growing in quite a colony under hemlocks.

Microstylis unifolia (Michx.) BSP., only two specimens found.

Smilacina trifolia (L.) Desf. There are rather large areas of this surrounding the little pools. It is one of the swamp plants that seems to have increased since we first collected it here.

Clintonia borealis (Ait.) Raf. flourishes here.

Calla palustris L. covers one section of the brook.

Arisaema triphyllum (L.) Schott. In a very shady wet place, quite a colony of plants showed peculiarities that suggested its close relation to *A. Dracontium.* Each plant was quite strict in growth, the spathe slender and more erect at the summit than is usual in the type. The leaves were five-parted.

Solidago Elliottii T. & G. Two or three plants were growing in a rather open wet place.

Utricularia clandestina Nutt. completely filled one of the little pools to the exclusion of all other growths. Not a trace of the plant could be found in any of the near-by pools.

Nemopanthus mucronata (L.) Trel., lover of cold shady swamps, finds a congenial home here, and adds to the overhead tangle.

Sarracenia purpurea L. has been reported from this region, but we have not found it.

Carex subulata Michx. we suppose may, from the botanist's standpoint, be called the chief treasure of the swamp. It seems to be quite abundant here and we might wonder why it should be so rare when its facility in fastening its mature seeds on the clothing can be so well demonstrated by lightly brushing past a clump of it.

Stellaria borealis Bigel. grows in masses in and near the brook.

So much for the deepest part of the swamp. As we push through the bewildering tangle and come to the foot of the knoll, once inhabited by the pines, we find a profusion of

Lygodium palmatum (Bernh.) Sw. twining over the weeds and bushes and even clothing some of the old stumps with its delicate beauty. This fern has increased very much in the past years.

Aspidium simulatum Davenp. has been collected here by Messrs. Bigelow and Bissell, and is reported as quite abundant in some parts of the bog.

Linnaea borealis L. var. *americana* (Forbes) Rehder formed a thick mat over the roots of one of the old pine stumps. This was our great-

est find during the past season, as it is very rare in this state and we had seen it growing only once before — in Maine.

Rhododendron canadense (L.) BSP. has also increased amazingly since the destruction of the pines and now forms little thickets on the higher land bordering the marsh. Its being so much in evidence suggests a new name for this region — Rhodora Swamp!

As we emerge into the pasture lands we find a few small bogs, and on the edge of one of these

Lycopodium inundatum L. grows in rather a stunted fashion in one small colony.

On our way to North Cromwell Station, the swamp left well behind, we pass two or three small ponds and extract from them *Marsilea quadrifolia* L. possibly introduced from Bantam Lake, at one time its only known habitat in America.

Ceratophyllum and *Elodea* nearly choked one pond with their tangle, the former with its finely dissected leaves, and the latter dotting the surface of the water with its tiny blossoms not much larger than pin-heads.

In a neighboring pasture one of the party discovered many fine specimens of that elusive but not rare little fern *Ophioglossum vulgatum* L.

Referring to the Catalogue of the Flowering Plants and Ferns of Connecticut, we find of the species mentioned in these notes, one (*Carex subulata*) has not been recorded; thirteen are set down as "rare," and several others as "occasional" or "local." Considering that most of the choicest specimens were found in a spot of but a comparatively few rods in radius, it seems as if Pine Swamp — or as we would like to call it, *Rhodora Swamp* — in Central Connecticut were worthy of more than a passing notice.

Hartford, Connecticut.

PTELEA MOLLIS VAR. CRYPTONEURA, A WAFER-ASH OF THE GEORGIA SAND-HILLS.

Harley Harris Bartlett.

In the winter of 1907 I sent to a considerable number of correspondents specimens of a wafer-ash from the fall line sand-hill region near Thomson, Georgia. Field observation had convinced me that it was not *Ptelea trifoliata*, neither did it correspond with any of the descriptions which had recently been published by Greene, Small, or Heller. Because of the descriptive appropriateness of the name, which had been given in 1849 by M. A. Curtis to a plant of North Carolina, I distributed my material as *Ptelea mollis.* The Biltmore Herbarium had previously sent out specimens from Wrightsville Sound, North Carolina (near Wilmington, the type locality of *Ptelea mollis*), which accorded with Curtis's original description but differed in several regards from my Georgian specimens.

The original publication of *Ptelea mollis* by Curtis [1] was as follows:

"Ptelea mollis, *n. sp.*— P. trifoliata, β mollis, *Torr. & Gray?* I. 680. Lateral leaflets oval, the terminal obovate, with an abrupt acute point, the under side with the petioles, panicles and young branches, clothed with a soft whitish silky villus; cymes compact, with short branches; style long; filaments equalling the anthers.— Wilmington, N. Car. Also, Newbern, N. C., *George Wilson, Esq.*: the low country of S. Car.; *Rev. T. J. Young.*

The style in this species is twice as long as in P. trifoliata, while the filaments are only about one third or one fourth as long. The mature leaves are much more rigid. With the exception of the style, this plant is much smaller in all its parts, and the sepals [are] very deciduous. Flowers tetrandrous."

Although Curtis described his plant as a *new species,* he took its name from the older *Ptelea trifoliata β mollis* T. & G. Since he himself questioned the synonym, we may compare his diagnosis with that of Torrey and Gray [2]: —

"*Ptelea trifoliata* . . . . *β mollis*: branchlets, petioles, and lower sur-

[1] New and Rare Plants, chiefly of the Carolinas, M. A. Curtis. Am. Journn. Sci. ser. 2, vii. (1849), p. 406.

[2] Fl. i. (1840), p. 680.

face of the leaves clothed with a soft tomentose pubescence, even when old. (Texas, *Drummond!*)"

It is obvious that there is scant evidence for considering the two names synonymous. If they are, it will be necessary to find another name for a plant of the Great Lake region (collected by the late Prof. C. F. Wheeler at Saugatuck, Michigan, and by Mr. C. C. Deam near Michigan City, Indiana, No. 7087, 31 July, 1910) which is now called [1] *P. trifoliata* var. *mollis* T. & G., but which is clearly different from *P. mollis* M. A. Curtis. Under the circumstances, there can hardly be any valid objection to maintaining both *P. mollis* M. A. Curtis (excl. syn.) and *P. trifoliata* var. *mollis* T. & G.

In his diagnoses of Ptelea species, Dr. Greene [2] has laid much stress upon the nervation of the samara. " . . . .This seed-bearing body is in some [species] marked by rather closely parallel transverse ridges, with lines of gland dots running between them, or else the ridges are irregularly broken and run into a reticulation, with one or more dots in the middle of each mesh. In either instance the ridges may, at the edge of the body or a little beyond it, unite to form a wall more or less definitely surrounding the body — which wall I denominate the circumvallation — or they may pass directly into the reticulation of the wing itself, leaving the body without circumvallation." It is in this character which Dr. Greene calls the "circumvallation" that both *Ptelea trifoliata* var. *mollis* (Mr. Deam's material from the sand dunes of northern Indiana) and *P. mollis* M. A. Curtis differ from the Georgian shrub which is here proposed as *P. mollis* var. *cryptoneura*.

In the one case we have typically "circumvallate" samaras, with strongly marked transverse ridges on the body; in the other case there seems to be no "circumvallation," and the transverse ridges of the body are altogether obscure. Since *Ptelea mollis* differs otherwise from its var. *cryptoneura* in merely trivial details, which might well be comprehended within the range of fluctuating variability of the species, my curiosity was aroused to find out whether or not there was actually a structural difference between them. Samaras of both types were boiled with caustic potash solution, in order to remove the softer tissues from the vascular framework. The two skeletons obtained could hardly have been told apart. In both, the longitudinal

[1] Gray's Manual, ed. 7, p. 537.

[2] The Genus Ptelea in the Western and Southwestern United States and Mexico, E. L. Greene. Cont. U. S. Nat. Herb. x. part 2 (1906), p. 51.

nerve, continuous with stipe and style, gives off parallel transverse nerves which anastomose at the edge of the body, forming a "circumvallation." In variety *cryptoneura* (so named because the fruit does not show the transverse body nerves and their anastomoses at the inner edge of the wing) the stipe of an unskeletonized samara shows but one nerve, notwithstanding the fact that the two lateral nerves are as well developed as in *P. mollis*, and can be exhibited by removing the overlying tissues. Since in these two plants the presence or absence of "circumvallation" depends upon the varying thickness of the loosely cellular tissue under the epidermis, I have not regarded it as of more than varietal worth.

Ptelea mollis var. **cryptoneura** var. nov. Frutex humilis patens, ramulis atro-purpureis, vetustioribus glabris, junioribus puberulis. Folia matura coriacea crenata, supra pallido-viridia sparsim crispo-pubescentia, subtus albicantia perdense pubescentia; foliolis ovatis apice acutiusculis, obtusis vel rotundatis, lateralibus basi abrupte angustatis; terminali lateralibus dimidio longiore, basi sensim angustato. Samarae 1.7–2.2 cm. longae, ovatae, vel fere orbiculares, apice emarginatae; centro nervos transversos et eorum confluentes ad alae insertionem solum obscurius exhibente, dense fusco-punctato; ala pallido-straminea sparsim punctata.— *Bartlett 951*, 1 Sept., 1907, and *1748*, 10 Aug., 1909, sand-hills and pine barrens near Thomson, McDuffie Co., Georgia. This variety differs from the specimens of *Ptelea mollis* distributed by the Biltmore Herbarium in the following minor points besides those already enumerated:— the leaflets are not abruptly acute at the apex; the body of the samara is more densely punctate; the samara is more nearly orbicular; the twigs are not glabrate until their second season.

Bureau of Plant Industry, Washington, D. C.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— X.

In the genus *Scirpus* there are seven species or varieties which have been reported from only a single place, while numerous others have only a few known stations. Three or four of these are recent segregates, which have not been collected much since their characteristics

were pointed out, and two or three of the varieties are local forms not very frequent anywhere. This leaves about twelve which are distinctly rare in our section. A few of these are northern, but several of them seem to be stragglers from the pine-barren region further south. There is no reason why a careful search of the district should not reveal other ponds as rich as Winter Pond and Heard's Pond, but thus far the quest has not been successful. There are still numerous unexplored ponds in the district, and a large number just south of our borders. The questions of distribution raised by such facts as are stated here are most interesting, and should lead to more field work.

CYPERACEAE.

SCIRPUS.

S. americanus Pers. Mud and gravel near salt and fresh water. Abundant in eastern half of district, but only one station (Wayland) reported in western towns.

S. atrocinctus Fernald. Bogs and swales. Unreported from southeastern section, but fairly common elsewhere.

S. atrocinctus Fernald, var. **brachypodus** Fernald. Salisbury (*A. A. Eaton,* 1898); Amesbury (*A. A. Eaton,* Aug. 28, 1897); Reading (*C. E. Perkins,* July 12, 1882).

S. atrovirens Muhl. Andover (*A. S. Pease,* July 21, 1901); moist soil, Westford (*W. H. Manning,* Aug. 9, 1882); Medford Branch R. R., Medford (*Wm. Boott,* July 23, 1867); field, Medford (*Wm. Boott,* July 12, 1868); damp woods, Moose Hill, Sharon (*W. P. Rich,* July 12, 1896).

S. campestris Britton, var. **Fernaldi** (Bicknell) Bartlett. Kernwood, Salem, some specimens over five feet high (*J. Robinson,* July 27, 1879); banks of Mystic River, Medford (*Wm. Boott,* Aug. 23, 1859).

S. campestris Britton, var. **novae-angliae** (Britton) Fernald. Salt marsh, Ipswich (*J. H. Sears,* Aug. 24, 1886); Somerville (*C. E. Perkins,* Aug. 26, 1879); Watertown (*C. E. Perkins,* July 17, 1880); shallow water in brackish marsh, Scituate (*W. P. Rich & E. F. Williams,* Sept. 8, 1901).

S. campestris Britton, var. **paludosus** (A. Nelson) Fernald. Salt marshes, abundant along the coast.

S. cyperinus (L.) Kunth. Swamps and shores of ponds. Not

reported from northwestern portion of district, but apparently frequent elsewhere.

S. cyperinus (L.) Kunth, var. **Andrewsii** Fernald. Glacialis, Cambridge (*M. L. Fernald*, Oct. 16, 1905).

S. cyperinus (L.) Kunth, var. **condensatus** Fernald. Swamp east of Glacialis Pond, Cambridge (*H. H. Bartlett*, Oct. 17, 1905); railway near Hammond's Pond marshes, Newton (*Wm. Boott*, Aug. 23, 1884); burned place, low ground, Cliff Road, Wellesley (*K. M. Wiegand*, July 27, 1908); swamp, Hingham (*C. H. Knowlton*, Sept. 18, 1910).

S. cyperinus (L.) Kunth, var. **pelius** Fernald. Swamps, marshes and pond borders. Reported from several well-distributed stations, and probably common throughout.

S. debilis Pursh. Swamps and sandy shores of ponds. Frequent in central and northeastern portions of district.

S. debilis Pursh, var. **Williamsii** Fernald. Massapoag Pond, Sharon (*G. G. Kennedy*, Aug. 31, 1892; *E. F. Williams & M. L. Fernald*, Sept. 7, 1901; other collections since. This is the type station, and the plant has never been collected elsewhere. Published in Rhodora III, 252, 1901.

S. fluviatilis (Torr.) Gray. Ipswich River (*J. Robinson*, Aug. 22–23, 1876); Lawrence (*J. Robinson*, Sept. 26, 1877); Brighton (*C. E. Perkins*, June 30, 1879); in deep water, Heard's Pond, Wayland (*G. G. Kennedy*, Aug. 22, 1910).

S. georgianus Harper. Moist soil; frequent in northern and central portions, doubtless common throughout.

S. Hallii Gray. Sandy shore, Winter Pond, Winchester (*Wm. Boott*, Sept. 10, 1876. Numerous other collectors since). The only known station northeast of Georgia and east of Illinois.

S. heterochaetus Chase. Banks of Charles River at Cow Bay, Dedham (*F. F. Forbes*, Aug. 7, 1907).

S. hudsonianus (Michx.) Fernald. Wet meadows and peat-bogs, occasional in Essex and Middlesex counties. A northern plant, rare in our district.

S. Longii Fernald. Boston (*C. E. Faxon*, no date); swamp, Chamberlain lot, Dedham (*F. F. Forbes*, June 3, 1900); damp ground, Charles River meadows, Dedham (*F. F. Forbes*, June 26, 1908). A new segregate, to be looked for elsewhere in the district. See Rhodora XIII, 4, 1911.

S. nanus Spreng. Salt marshes and shores of tidal streams. Re-

ported from Gloucester to Watertown; also by fresh water at Spot Pond, Stoneham (*L. H. Bailey*, Aug. 1, 1883).

S. occidentalis (Wats.) Chase. In water near pond margins; Pleasant Pond, Wenham (*J. A. Lowell*, July, 1847); "Essex Co." (*Wm. Oakes*, no date); Revere (*H. A. Young*, September, 1878); Fresh Pond, Cambridge (*Wm. Boott*, July 9, 1853); Heard's Pond, Wayland (*G. G. Kennedy*, Aug. 22, 1910).

S. Olneyi Gray. Ditches in salt marsh, Kent's Island, Newbury (*A. A. Eaton*, Aug. 12, 1897).

S. pedicellatus Fernald. "Merrimac Valley" (*J. Robinson*, June 22, 1879). A northern species, rare in this district.

S. pedicellatus Fernald, var. **pullus** Fernald. Pleasant Valley, Amesbury (*A. A. Eaton*, Aug. 28, 1897); swampy shore, Coy's Pond, Wenham (*C. H. Knowlton*, Sept. 20, 1908).

S. planifolius Muhl. Dry open woods and rocky hillsides. Not reported from northwest or southeast, abundant elsewhere.

S. robustus Pursh. Salt marshes; Newbury (*E. F. Williams*, July 31, 1898); Dorchester (*J. R. Churchill*, Sept. 13, 1903).

S. rubrotinctus Fernald. Wet places, common throughout.

S. Smithii Gray. Muddy shores; Shawsheen River near pond, North Andover (*J. Blake*, September, 1883); Heard's Pond, Wayland (*M. L. Fernald*, Sept. 10, 1909; *M. L. Fernald & A. J. Eames*, Sept. 18, 1909. See RHODORA XI, 220, 1909); Westwood (*W. P. Rich*, Oct. 6, 1901).

S. subterminalis Torr. Ponds and slow streams, mostly submerged. Not reported in southern section, but frequent elsewhere.

S. sylvaticus L. Wet places; Lawrence, Andover, Revere, Woburn, Winchester, Sudbury.

S. Torreyi Olney. In shallow water and mud; Lawrence, Medford, Concord, Dedham, Ponkapaug Pond (Canton or Randolph), Wellesley; Groton, Westford, Stoneham, Littleton (according to Dame & Collins, Fl. Middlesex Co. 113, 1888).

S. validus, Vahl. In water of ponds and brooks, common.

C. H. KNOWLTON
J. A. CUSHMAN
WALTER DEANE
A. K. HARRISON } *Committee on Local Flora.*

SIMILARITY OF COLOR IN BUD AND IN LEAF.

Heyward Scudder.

During the last year I have noticed that the dominant color of the leaf-bud is the dominant color of the leaf after it has turned in the autumn. The most familiar examples of this are to be seen in the maples, particularly the swamp maple, and the willows. It is also true of the beeches, many of the rose family, and of the heath family as represented by the huckleberry and blueberries. The rhododendron, which is an evergreen, has green leaf-buds. In the case of the oaks the general color of the turned leaf is brown. But this varies so that the dominant color may be red (giving a red brown) or yellow (giving a yellow brown). So far as my observation goes the oak leaf-bud follows the principle just stated, varying as does the dominant color of the turned leaf.

If this fact is not already known, it is worthy of further observation. The nature and cause of the change of color of the leaf in autumn are better understood at present than they were formerly. But, as is the case with many of the problems of animal and of vegetable life, there is a great tendency to draw conclusions which are really statements of the problem in another form, the use of new words concealing the lack of advance in knowledge. (I admit that this is true in other branches of chemical work, but in them it is easier to get some sort of check on the accuracy and value of the work, than it is in the case of the chemistry of the changes connected with animal and vegetable life.)

There is no obvious reason why *Penicillium glaucum* in a mixture of dextro- and laevorotatory salts, should prefer one to the other, although able to use both, nor why one plant should use a considerable amount of silicon, when most plants use very minute amounts. The generalizations are difficult to reach, both because of the great variations produced by small changes in environment (whether terrestrial or atmospheric) and because of the limited amount of knowledge we actually possess.

While some plants are known to contain alkaloids, recent work makes it quite certain that these compounds are not fixed bodies, *e. g.* the alkaloid aconitine varies in composition, depending on the

species of the plant, and possibly on some local conditions of growth. The physiological effects of these different kinds of aconitine probably vary slightly, though all have the same general effect. Specific enzymes exist in many plants, but it is difficult to get much accurate knowledge about them, outside certain effects that they produce.

If enzymes are responsible for all color-changes in plants, this relation of the color of leaf-bud and of turned leaf is of interest. It would require a good deal of field work to verify the relation, but it certainly seems worthy of further study.

Boston, Massachusetts.

THE WINTER MEETING OF THE VERMONT BOTANICAL CLUB.

Nellie F. Flynn.

The sixteenth annual winter meeting of the Vermont Botanical Club was held at the Williams Science Hall, University of Vermont, Friday and Saturday, Jan. 20 and 21, 1911, in conjunction with the Vermont Bird Club. The sessions were interesting and well attended.

Twelve botanical papers were presented and discussed. The principal ones were "Botanical Trips in Western Louisiana," by Dr. Ezra Brainerd, illustrated by beautiful mounted specimens, "A Botanical Garden as Related to Botanical Work," by Dr. George P. Burns, illustrated by lantern slides of some European botanical gardens, "Sketch of the Work of the Poisonous Forage Plant Division of the Department of Agriculture in Colorado during 1910, by Willard W. Eggleston, and "Flora and Fauna of Hart Island," by Jay G. Underwood.

The annual supper, complimentary to the visiting members, was held as usual at the Y. M. C. A. Hall Friday evening. Post prandial exercises in the shape of the annual roll call, brought out many witty responses.

Sixteen new members were elected and on invitation it was decided to hold the next winter meeting at St. Johnsbury. The summer meeting will probably be at Mt. Horrid in Rochester the first of July.

Officers were elected as follows: Pres., Ezra Brainerd, Middlebury; Vice-Pres., C. G. Pringle, Burlington; Sec., G. P. Burns, Burlington; Treas., Mrs. Nellie F. Flynn, Burlington; Editor, G. L. Kirk, Rutland; Librarian, Miss Phoebe M. Towle, Burlington; Asst. Librarian, Miss Helen L. Hodge, Burlington; Committee on summer meeting, G. P. Burns, Burlington, G. L. Kirk, Rutland, and D. L. Dutton, Brandon. Committee on next winter meeting, Miss Delia I. Griffin, St. Johnsbury, J. G. Underwood, Hartland, and Mrs. Nellie F. Flynn, Burlington.

SOME INTRODUCED PLANTS OF CONNECTICUT.

Arthur E. Blewitt.

After one has exhausted about all the possibilities of his local flora, the waste grounds and dumping places are sources of keen enjoyment. No matter how often they are visited the unexpected is liable to happen and the discovery of some unknown plant, a waif or stray far from its known habitat, is a thing to be expected at any time. An old yard and dumping ground, perhaps an acre or more in extent, about a rubber reclaiming factory at Naugatuck, Connecticut, is a notable example and for its size a remarkable number of plants have been found there, most of them rare and many of them unknown in the state except at this place. Visiting this station is like being suddenly transported to a distant part of the country, to the Central Western States, for example, the transformation is so complete, with so many strange plants on every side. Only those of more than ordinary interest will be mentioned.

The grasses are poorly represented. *Panicum virgatum* L., a tall, handsome grass, is well established at one small station. *Setaria verticillata* (L.) Beauv. has been collected. The very handsome *Eragrostis megastachya* (Koeler) Link is in a thriving condition. The genus *Bromus* is represented by three species, namely, *B. tectorum* L., which is becoming well established in many places about the state, *B. squarrosus* L., which has been collected in considerable quantity but is not flourishing, *B. inermis* Leyss., well established in

one locality. *Agropyron tenerum* Vasey has been collected but is now probably extinct. *A. caninum* (L.) Beauv. is rare. The squirrel-tail grass, *Hordeum jubatum* L. grew there in abundance one season. *Elymus brachystachys* Scribn. & Ball, a grass of the far west has been collected, also another species not yet determined.

Of the *Polygonaceae* there are three representatives. *Rumex altissimus* Wood, a handsome species with pale green glaucous leaves, is well established. *R. mexicanus* Meisn. is rare. *Polygonum ramosissimum* Michx. has been collected. *Chenopodium urbicum* is well established, also *Atriplex patula* L., var. *hastata* (L.) Gray and *Salsola Kali* L., var. *tenuifolia* G. F. W. Mey. *Amaranthus blitoides* Wats. carpets the ground in several places. *Acnida tuberculata* Moq. and the strikingly handsome plant, *Oxybaphus nyctagineus* (Michx.) Sweet, were collected for several seasons. The *Cruciferae* are well represented. *Alliaria officinalis* Andrz. and *Berteroa incana* (L.) DC. have been collected. *Thlapsi arvense* L., *Brassica juncea* (L.) Cosson, *Lepidium apetalum* Willd., *Sisymbrium Loesellii* L., *S. Sophia* L., and *Camelina microcarpa* Andrz. are all established and more or less abundant. *Potentilla recta* L. and P. *intermedia* L. are in a flourishing condition. The two sweet clovers, *Melilotus alba* Desr. and *M. officinalis* (L.) Lam., are abundant and spreading, also *Vicia Cracca* L. A small station of *Convolvulus arvensis* L. is in a flourishing condition. *Cynoglossum officinale* L., with its peculiar-colored blossoms, has been collected each year. *Lithospermum arvense* L. has been collected in an adjoining field. *Verbena stricta* Vent., a tall, erect, and very handsome plant of the western plains, is well established and thriving. One plant of *Siderites montana* L., a native of Southern Europe, was found the season of 1908. *Solanum carolinense* L., a vicious and persistent weed, is spreading. *Galium verum* L. has been collected several seasons but is not in a flourishing condition.

The composite family is well represented by a number of species and most of them are thriving. *Lactuca Scariola* L. and its closely related var. *integrata* Gren. & Godr. are spreading. The tall, rank, western weed, *Iva xanthifolia* Nutt., is well established. A few plants of *Xanthium spinosum* L. were found for several seasons. *Grindelia squarrosa* (Pursh) Dunal, a gummy plant, native of the western plains, has been collected several seasons. *Helianthus Maximiliani* Schrad. and *H. petiolaris* Nutt., two more western species, have been collected. *H. Maximiliani* persists. The Matricarias are well represented,

three of them having been collected, namely, *M. inodora* L., *M. Chamomilla* L., and *M. suaveolens* (Pursh) Buchenau. The Artemisias are also well represented, six having been collected as follows: *A. Dracunculus* L., *A. annua* L., *A. biennis* Willd., *A. frigida* Willd., *A. campestris* L., var. *pubescens* (Jord. & Fourr.) Rouy & Foucaud, also *A. Absinthium* L., the last being the only member of the genus that is established and thriving.

For the past two years many plants in a portion of this place have been killed by the fumes of an acid factory while those that survive are badly seared and burned by the deadly gases.

Waterbury, Connecticut.

Castanea pumila in eastern Massachusetts.— I am surprised to hear from Prof. Fernald that there is apparently no published record of the occurrence of *Castanea pumila* (L.) Mill. in the Stony Brook Metropolitan Reservation in Boston. Two clumps of this southern dwarf chestnut have been known there for at least fifteen years.

I have forgotten to whom belongs the credit of first discovery, but I am inclined to think the station was first found by Prof. John G. Jack of the Arnold Arboretum, who accompanied a party of botanists bent on collecting this plant, so rare in our neighborhood, on June 26th, 1897. We found the two clumps some two hundred feet apart from each other, and in fine flower at that time. They were growing a few feet from a rough cart road on a dry, sandy hillside, among dwarf oaks. On October 2nd, 1898, I secured some fine fruiting specimens. I have not visited the station since 1904, at which time it was still thriving. How this *Castanea* got started in this spot is a mystery. It is very seldom cultivated, and none of it was known to exist in the neighborhood at the time we first saw it. The place where it is growing, moreover, was remote from habitations and gardens, and seldom visited prior to the establishment of the Stony Brook Reservation in the late nineties, except by small boys in pursuit of mud turtles and pickerel in the pond near by.— E. F. Williams, Cambridge, Massachusetts.

Winter Meeting, Josselyn Botanical Society of Maine.— About thirty people interested in Maine plants attended the Josselyn Society meeting held in Portland, at the rooms of the Portland Society

of Natural History. Friday evening, Feb. 24, Prof. K. M. Wiegand spoke on Character in Winter Buds, illustrating his talk with specimens of various twigs. Prof. J. F. Collins spoke of the six species and two varieties of *Polytrichum* known in Maine. Dr. L. W. Riddle described lichens, and talked of their distribution in Maine. The State furnishes a large field, in which comparatively few extensive collections of lichens have been made.

Saturday morning, Feb. 25, the society took a three-mile walk on Cape Elizabeth. Among the species noted were *Prunus maritima* Wang., *Cynanchum nigrum* (L.) Pers., true *Eupatorium purpureum* L. (new to Maine), an interesting *Carya*, and the prostrate shore form of *Juniperus virginiana* L. Dr. Riddle collected about 30 lichens, the most interesting of which were the coastal *Cladonia reticulata* (Russell) Wainio, and the southern *Usnea trichodea* Ach.

Saturday afternoon Prof. M. L. Fernald showed specimens and described many recent additions to the Maine flora. Mr. C. H. Knowlton talked about the boreal flora of the Washington county coast, showing numerous specimens classified by habitats as woods plants, beach and marsh plants, species of the rocky headlands and of the peat bogs.

Eight new members were elected to the society. The summer meeting will be held at Brunswick, Aug. 22–25. C. H. Knowlton, Hingham, Massachusetts.

Plants in Flower February 8, 1911, at Clemson College, South Carolina.— Upon various collecting trips about Clemson College, South Carolina, about thirty miles from the main range of the Blue Ridge Mountains, in the western part of the state, the following plants were collected in flower upon the above date: *Acer rubrum, Alnus rugosa, Arabis virginica, Capsella Bursa-pastoris, Hepatica triloba, Lamium amplexicaule, Prunus Persica,* and *Stellaria media.*

All of these with the exception of maple and peach have been in full flower for three weeks and more, and besides those mentioned there is a large number of exotic plants in flower out of doors.

A more interesting observation than these, in all probability, is the occurrence of *Hepatica*, which grows only upon the northern or cooler slopes of the hillsides here, in flower upon November 12, 1910 in this neighborhood. Of course the season for January here was much

warmer than usual with that month but we thought that readers of Rhodora would be interested to hear of these unusual periods of flowering.— John G. Hall & A. B. Massey, Clemson College, South Carolina, February 8, 1911.

Glyceria acutiflora in Vermont.— Last season I found two small stations near this city for *Glyceria acutiflora* Torr., a grass not heretofore reported for Vermont. The first station was at the border of a small low pond, where the new grass was mingled with *G. borealis* (Nash) Batchelder, the latter greatly predominating. As I had been to the same spot many different seasons and had not noticed *G. acutiflora*, I am led to believe that it probably occurs more frequently than is supposed, but has been overlooked because of its resemblance, at a casual glance, when growing, to *G. borealis*. A few weeks subsequent to the finding of the first station I saw the grass again, a few plants growing along a brook in an alder swamp about two miles from the initial station. The brook and pond waters have no connection.— George L. Kirk, Rutland, Vermont.

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AMATEUR BOTANICAL ILLUSTRATING.

Agnes Chase.

It has recently been represented to the writer that botanists in general are unaware of the fact that it is not necessary to be an artist or even to have any artistic ability in order to prepare botanical illustrations, and it has been suggested that I (myself an evidence of this fact) tell others how it may be done.

The camera lucida, the reliance of most amateur illustrators, I never found satisfactory, for, if it is used with any object except the thinnest, the image is badly distorted. The simple method by which anyone, willing to take pains, may make accurate detail drawings is this: The object to be drawn is placed on a dissecting microscope, on a glass slide ruled in millimeter squares. The drawing paper is very lightly ruled in pencil in squares of the proper size to give the enlargement desired, in centimeters for an enlargement of 10 diameters, 5 millimeters for 5 diameters, etc. The object is then copied in outline, square for square, a hard pencil being used. This insures accuracy of outline after which details within can with care be correctly drawn. In preparing for dissection and drawing portions of dried specimens, such as the spikelets of grasses, heads of Eriocaulon, and Compositae, involucres of Euphorbia and flowers of Labiatae, glycerin will be found a valuable aid. These parts soaked or boiled in water alone, or soaked in alcohol or potash if of indurated texture, dry out so rapidly under the microscope that they are difficult to work with and change shape so continually that only a "lightning artist" could keep up with them. If boiled in water with a little glycerin these parts become pliable and can be dissected and displayed without tearing them. One does not have to work with needles or scalpel in a puddle of water, the

excess moisture can be taken up with a blotter or handkerchief and the glycerin-prepared tissue, whether delicate or indurated will not dry out. A further and great advantage is that the dissected pieces may be put away in an envelope on the herbarium sheet and will keep for reference — I do not know how long but at least for years. About three or four drops of glycerin to an inch of water in a small test tube (or to a teaspoonful of water) is the proper proportion. The parts to be dissected are dropped in this and brought to a boil. A few drops of glycerin placed on the object and a little boiling water added answers the purpose about as well as test tube and alcohol lamp.

The glass slides ruled in millimeter squares can be ordered from any dealer in microscopes and cost about two dollars, or those with finer lines with a row of squares ruled in tenths, about five dollars. The latter are necessary for mosses but not for flowering plants. It is convenient to have the slide 5 × 7 centimeters, the ruled square, 20 × 20 mm., in the center. Leaves or entire plants or portions of them may be drawn in the same way by laying the part to be illustrated on an herbarium sheet ruled in centimeter squares. For paper I have found the heaviest weight of linen ledger more satisfactory than any drawing paper. The heavy ledger paper permits a great amount of erasing without furring up under the pen. Before redrawing the erased place should be rapidly rubbed to a polish by means of some smooth rounded object such as the bone handle of a knife, otherwise the ink may spread on the scratched place. The pencil drawing when worked up to the best of one's ability may then be "inked in," using Higgin's India ink. For the beginner this is the trying part. Pen-and-ink is a much more difficult medium with which to express what one sees before him than is a pencil, but if the illustration is to be published, pen and ink is necessary unless one can afford to pay for wood-cuts or lithographs or is content with the usually unsatisfactory half-tone. Drawings for publications should be made at least twice the diameter the illustration is intended to be when printed, or, if one's lines are unsteady, the drawings may be made three or four times larger, to allow for greater reduction. It is necessary to keep in mind, however, that in so great a reduction spaces as well as lines are reduced and that unless kept well apart adjacent lines will run together and cause black spots or smudges, and also that the lines unless fairly heavy may appear broken. By practice one learns to make firm lines and a reduction to one half diameter effaces small

unevennesses. For ordinary work a Gillott 303 pen and for light lines (representing silky pubescence for instance) a Gillott 290 will be found about the right size. For the beginner outline drawings alone may suffice. Shading should be put in first with pencil until the desired effect is produced, the object being placed in such position as to make the shadows show the form to best advantage. When the surface permits of its use, stippling is the easiest way of shading. The pencil lines are erased from the finished drawing by a soft rubber, such as "Erasit" or "Artgum." One soon learns to take advantage of veining, scabridity, pubescence, etc., in expressing form and texture. Ideas may be gained by carefully studying the successful representation of particularly difficult subjects, as for instance, the heads of Antennaria and the Xanthium burs in Gray's Manual, 7th edition. I know of nothing more difficult to represent naturally in pen and ink than white pubescence or pappus, and spines, awns or hairs standing straight out. If such drawings are studied through a magnifying glass a better idea of the workmanship is obtained. The illustrations of the willows are good examples of stippling and pubescence used for shading. It is not meant to suggest that one should imitate these drawings but should study them to gain ideas only. If one is able to bestow any art on his drawing so much the better but it is the truthful, even if crude, illustration that is of value. In whatever tongue a description is published an accurate illustration speaks in every language, and drawing is well worth cultivating as a method of expressing the truth as we see it.

Bureau of Plant Industry, Washington, D. C.

THE NORTHERN VARIETY OF GAYLUSSACIA DUMOSA.

M. L. Fernald.

In June, 1910, Professor Wiegand and the present writer, in discussing a typical sphagnum bog of the coast of eastern Maine, said:

"Practically all the vascular plants of this Quoddy Head heath were such as one would expect above tree-line on Mt. Katahdin or Mt. Washington or in the subarctic tundra of Labrador — *Scirpus caespitosus* L., *Carex pauciflora* Lightf., *Comandra livida* Richardson, *Rubus Chamaemorus* L., *Empetrum nigrum* L., *Vaccinium pennsyl-*

vanicum Lam., var. *angustifolium* (Ait.) Gray, *Aster radula* Ait., var. *strictus* (Pursh) Gray, etc.— but the most conspicuous plant at the time of our visit was *Gaylussacia dumosa* (Andr.) T. & G., forming dense depressed shrubs only 1 or 2 decimeters high, closely embedded in the *Sphagnum*, and loaded with beautiful white or pink-tinged bells. The distribution of this very distinct *Gaylussacia* is notable, for it occurs in bogs and wet swamps all the way from Newfoundland to Louisiana, in New England at least rarely extending far from the coast. Yet the plants with which it is associated in the Lubec bog and elsewhere in eastern Maine are chiefly polar types which do not extend far southward into the temperate areas of eastern America." [1]

At the time of writing this note our comparison of the northern and southern specimens of *Gaylussacia dumosa*, though revealing a slight habital difference, showed nothing more tangible by which the northern and southern extremes of the species could be separated. Later, in a letter Dr. R. M. Harper called attention to the fact that in the South *G. dumosa*, which in the North is a shrub of sphagnum bogs, occurs in dry barrens, and a search of literature as well as an inspection of herbarium labels emphasizes this fact. Thus Michaux, mistaking *G. dumosa* (*Vaccinium dumosum* Andrews) for the Linnaean *V. frondosum*, described it as growing "in pinetis, aridis, a Virginia ad Floridam"; [2] Pursh taking it up as *Vaccinium dumosum* said that it grew "in dry sandy woods, particularly pine-forests: New Jersey to Florida." [3] Elliott said it "grows in dry, sandy soils," [4] and more recently Mohr has defined its habitat in Alabama as "Dry barren siliceous soil" [5] and its general distribution in the South as "Rare in the mountains, abundant in the dry pine barrens of the coast region." [5] Chapman, however, gives a slightly different account: "Low sandy pine barrens and swamps," [6] and though the labels of a very few herbarium specimens from North Carolina and Florida read: "low grounds" or "border of marsh," the great majority of specimens are from dry habitats.

In the more northern coastal states and the Maritime Provinces we find the habitat stated as follows. By Jacob Bigelow who took the northern plant to be Aiton's southern *Vaccinium hirtellum* it was found "In the edge of Richards' pond, Brookline [Massachusetts]", [7]

[1] Rhodora, xii. 106, 107 (1910).
[2] Michx. Fl. Bor. Am. i. 230 (1803).
[3] Pursh, Fl. Am. Sept. i. 285 (1814).
[4] Ell. Sk. Bot. S. Car. and Ga. i. 497 (1821).
[5] Mohr, Plant Life of Alabama, 657 (1901).
[6] Chapm. Fl. 258 (1860).
[7] Bigelow, Fl. Bost. ed. 2, 152 (1824).

and Bigelow made the discriminating observation: "Very nearly allied to *V. dumosum* of Pursh, and perhaps only a variety. Its aquatic growth and hirsute berries, which I do not find mentioned by American botanists, have led me to separate it from that species, with which it is usually considered synonymous."[1] Torrey, treating *Vaccinium dumosum* Andr. as synonymous with *V. hirtellum* Ait., took them both up as *Gaylussacia hirtella* (Ait.) T. & G. and stated that in New York it grew in "borders of ponds, and in wet sandy soils,"[2] Fowler in his Plants of New Brunswick listed it only from "a peat bog."[3] Rand & Redfield found it on Mt. Desert Island only "in sphagnum bogs"[4] and the Connecticut Flora lists it only from "sphagnum bogs."[5] Similarly all the material in the Gray Herbarium from Newfoundland, New Brunswick, Nova Scotia and New England, and in the herbarium of the New England Botanical Club, comes from sphagnum bogs, boggy margins of ponds or similar habitats; never from dry soil.

As a general rule the bog- and humus-plants of southern New England occur on our mountains or in northern Maine or eastern Quebec in drier habitats than with us but only a few species (*Cypripedium acaule, Pyrola americana, Epigaea repens, Gaultheria procumbens,* etc.) of our silicious or acid soils reverse the principle and northward seek the sphagnum bogs and wet mossy woods. And whenever this singular reversal of habitats is noted we naturally inquire if there may not be some specific or varietal distinction between the northern and southern plants. In some cases no very apparent difference is found and in *Gaylussacia dumosa* the only striking difference which at first appears is that, as a rule the southern plant has narrower leaves than the northern — generally oblanceolate in outline, while the leaves of the northern plant tend more to be elliptic- or oblong-obovate; but this is only a tendency and breaks down in a long suite of specimens. A close study of the two series, however, shows that in the northern plant the leaves and the bracts of the inflorescence are always copiously glandular-dotted on both surfaces, while in the southern plant of dry soils the upper faces of the leaves and bracts are usually quite glandless, though occasionally glandular when first

1 Bigelow, Fl. Bost. ed. 2, 152, (1824).
2 Torr. Fl. N. Y. i. 448 (1843).
3 Fowler, Prelim. List Pl. N. B. 41 (1885).
4 Rand & Redfield, Fl. Mt. Desert, 124 (1894).
5 Ct. Geol. Nat. Hist. Surv. Bull. xiv. 312 (1910).

expanded. In the intermediate belt, in eastern Pennsylvania for instance, the specimens are quite transitional in this character. In general, too, the calyx-lobes of the southern plant have smoother surfaces than in the northern, but this character is less obvious than is the presence or absence of glands upon the upper surfaces of the mature leaves and bracts. In this latter point the northern bog plant is so readily distinguished from the southern plant of dry sands that it seems best to separate them varietally. But when we approach the question of determining which was the original *Gaylussacia dumosa* we encounter some difficulty. The species, first designated as *Vaccinium dumosum* by Andrews in 1800, was inadequately described, the English reading: "Whortle-berry with oval, pointed, smooth leaves; flowers grow solitary from the foot-stalk of the leaves, close to the stem; foot-stalks of the flowers are very long, having floral leaves; blossoms pitcher-shaped, nearly white; ten chives."[1] The colored plate is very crude and shows neither pubescence nor glands upon the foliage, branchlets or even the calyx, so that it is impossible to say from the plate and description which extreme of the species Andrews had. In the note following the description, however, occurs the significant statement:—

"THIS species of Whortle-berry is a neat, compact, bushy shrub; and like all the rest of those which have ten chives, and the other parts consonant, can scarcely be considered as a hardy plant; for although it will live through a mild winter, if planted in a warm and dry situation, on an open border; yet it will in general be destroyed, by the severe frosts which happen late in spring.....As a hardy green-house plant it is best preserved in a flourishing state, and will flower about the month of June; in which month, this year, our drawing was made, at the nursery of Messrs. Lee and Kennedy, by whom it was introduced from North America in the year 1783."

From this note it seems most probable that *Vaccinium dumosum* was based upon the southern shrub of dry soils. The name was thus used by Pursh and other early American botanists, and as already noted the northern bog plant was treated by Jacob Bigelow as distinct, although the name he used for it unfortunately belonged to a southern extreme of the same group. In default of better evidence in the matter it seems best to treat the southern plant as typical

[1] Andrews, Bot. Rep. ii. t. 112 (1800).

Gaylussacia dumosa while the shrub of our northern bogs may appropriately bear the name

Gaylussacia dumosa, var. **Bigeloviana**, n. var. A forma typica recedit foliis fere elliptico- vel oblongo-obovatis usque utrinque glandulosis, bracteis utrinque copiose glandulosis.

Differing from the typical form in having the leaves commonly elliptic- or oblong-obovate, permanently glandular on both faces, and in having the bracts of the inflorescence permanently and copiously glandular above as well as beneath.— Sphagnum bogs, wet heaths, and boggy pond-margins, Newfoundland to Connecticut, and probably slightly southwestward. Type: heath at base of West Quoddy Head, Lubec, Maine, July 26, 1909, *Fernald & Wiegand* (*Fernald*, no. 2038 in Gray Herb). Other specimens examined — Newfoundland: as *Vaccinium frondosum*, without definite locality, *la Pylaie*; edges of bogs, Whitbourne, August 16, 1894, *Robinson & Schrenk*, no. 201: heaths overlying carboniferous area, Stephenville Crossing, August 14, 1910, *Fernald & Wiegand*, no. 3853: "rich rocky soil", hillside, Channel, July 27–Aug. 1, 1910, *Howe & Lang*, no. 872. New Brunswick: Kent County, July 14, 1870, *J. Fowler*. Nova Scotia: Smoky Mt., Cape Breton Island, August 8, 1898, *J. Macoun*, no. 19,775; Canso, July 26, 1901, *J. Fowler*. Maine: "Bangor Bog," Orono, 1880, *Kate Furbish*; growing with *Empetrum nigrum*, *Rubus Chamaemorus*, etc., Lubec, 1828, *Wm. Oakes*; Jonesport, *F. H. Peabody*; bog, Somesville, September 20, 1892, *M. L. Fernald*; Great Marsh, Great Cranberry Isle, Aug. 27, 1889, *E. L. Rand*, July 20, 1899, *E. F. Williams*; bog, Manchester, July 7, 1874, *F. L. Scribner*; Town Bog, Wells, July 11 and Sept., 1898, *Kate Furbish*; Wells Beach, 1898, *Kate Furbish*. New Hampshire: Muddy Pond, Pautuckaway Mt., Nottingham, September 15, 1899, *A. A. Eaton*. Massachusetts: pond, Tewksbury, June 23, 1853, *Wm. Boott*; Long Pond, Melrose, June, 1880, *H. A. Young*; sphagnum around Muddy Pond, Stony Brook Reservation, June 17, 1895, *W. P. Rich*, Aug. 23, 1896 and June 26, 1897, *E. F. Williams*; Hammond Pond, Newton, June 9, 1854, *Wm. Boott*; Muddy Pond, Dedham, August 18, 1854, *Wm. Boott*. Rhode Island: South Kingston, *S. T. Olney*. Connecticut: peat swamps, Southington, June 23 and September 1, 1897, *C. H. Bissell*, no. 385, June 7, 1899, *L. Andrews*, no. 798; open sphagnum bog, Litchfield, June 26, 1906, *C. H. Bissell*; Bethany, July 5, 1886, *E. B. Harger*.

Gray Herbarium.

ANOTHER STATION FOR CENTAUREA DIFFUSA.

Robert A. Ware.

In 1902, *Centaurea diffusa* Lam. was reported from Norfolk, Massachusetts.[1] As this plant of continental Europe seems not yet to have made its appearance in this country to any considerable extent it may be well to record its presence in Plainville, Massachusetts.

My friend and companion of many walks and drives, Dr. H. S. Kilby of North Attleboro, to whom indeed I am indebted for first arousing my botanical interests, had noted the strange plants and, in accordance with a pleasant custom, planned a trip which should reveal them to me. Without intimating the object of the trip, he took me on August 7, 1909, to the neighborhood, which is well removed from railroad and important thoroughfares — driving slowly that I too might have the joy of discovery. No doubt my enthusiastic expressions of interest were counted sufficiently rewarding, but not until specimens had found their way to the Gray Herbarium was their identity established.

Last year in July, I visited the station again. The plants were very numerous, occupying an open area about 45 × 90 m. of hard, dry, gravelly soil about a cellar where once stood a dwelling, since burned. They were from 2 to 8 dm. high, had a stout, elongated, vertical root, with few fibrous rootlets, and were grayish-green and scabrous throughout. Such basal leaves as they may have possessed earlier had disappeared at the time of my visits. Those of the stem and branches were not conspicuous, the uppermost being very small and entire, the lower pinnate with few, very narrow divisions. The numerous small heads, 2–5 mm. in diameter through the involucre, terminated the stiff, divergent branches and branchlets. The appressed tips of the outer involucral bracts were deeply and sharply pectinate-ciliate. The flowers were mostly white, with relatively few a delicate pink, and others a deeper rose-purple. Later examination with a lens, showed the pectinate tips to be minutely spinose, the inner bracts smooth, not pectinate, but with scarious margins more or less lacerate and a sharp, extended mid-rib, the achenes smooth and pappus setose.

[1] Rhodora, 4: 249. 1902.

Nearby, but on a slightly lower level, are the ruins of a tiny mill, its basement walls, water way and wheel still surviving. Seeking out the proverbial "oldest inhabitant" I found that, while he had never noticed the plants in question, he was possessed of a keen memory for the events of his earlier years. Welcoming a patient listener, he told me the story of the mill which for several generations prior to 1893 when it was burned, had contributed to the welfare of this isolated hamlet. For at least a part of its existence it had been devoted to the making of carpets, materials for which had been assembled from various sources.

While it is known that the plants have been growing there for at least a dozen years, the period is probably much longer. It is doubtless also safe to assume that the mill is responsible for their presence. And yet the wonder is that, having established themselves at all and having persisted so long, they have not increased their area far beyond the present limits. They have not even crossed to the opposite side of the narrow roadway where apparently conditions are identically the same. With the exception of a single plant found in an adjacent rather poor grass field, somewhat careful examination failed to reveal any extension of the limits first noted.

Boston, Massachusetts.

PTERIDOPHYTE NOTES FROM EASTERN MASSACHUSETTS.

Sidney F. Blake.

Woodsia obtusa (Spreng.) Torr. Winter occurrences of this plant are apparently rather rare at least in this region, so that it may be well to record four small specimens (no. 288, my herb.) of this species, of varying degrees of greenness, collected on a large rock in Canton on 27 March, 1909.

Dicksonia punctilobula (Michx.) Gray. On 21 March, 1909, I collected three small fronds (no. 285), which had endured the winter, on faces of cliffs in North Stoughton near the Avon boundary, possibly one or two of them really inside Avon limits. My search in the same locality on 30 January, 1910, failed to bring any of the plants

to light, but on 15 January of this year I found Dicksonia in comparative abundance both at this locality and at a new one clearly inside Stoughton territory. At the North Stoughton-Avon locality, where the fern was growing in protected nitches of the rocks on both the east and west sides of the railroad cut, I collected some sixteen fronds (no. 2067, my herb.), ranging in length from a minute and doubtless very young nearly perfectly green plant about 8 mm. long to one 12.5 cm. high with several pinnules or portions of pinnae brown and dead.

At the Stoughton locality the plants grew for some distance along the eastern side of the railroad, in a situation to receive the afternoon sun, chiefly in crevices on the western face of a stone wall bordering a slope descending toward the track. Here some thirty-four fronds (nos. 2065, 2066), more or less completely green, were collected, showing about the same variation in size as the other lot though averaging rather larger. In several cases, where the stipe was comparatively short in relation to the lamina (e. g., 2 cm. and 7.5 cm.) it was very thickly covered with the brownish hairs, as though imperfect development of the stipe had compressed them into smaller compass than normal. Dr. Robinson, who has examined all these specimens, agrees with me in thinking that the occurrence of so many fresh green fronds of small size (6 cm. long or less) can be explained only by supposing growth at favorable periods during the winter, which was exceptionally free from snow up to the date when the plants were collected.

So far as I have been able to ascertain, the Hay-scented Fern has not previously been credited with ability to withstand frosts and wintry weather. It is not mentioned in the late Mr. Davenport's notes on winter ferns, published in Rhodora in 1904.

Botrychium obliquum, var. *oneidense* (Gilbert) Waters. In Rhodora, xii, 80 (April, 1910), this grape fern was recorded from eastern Massachusetts on the basis of specimens collected in Canton, 8 March, 1909. Recent study of other specimens in my herbarium has convinced me that they represent the same form, and with this opinion Dr. Robinson, who has just examined them, agrees. The following representative sheets — no. 254, rich wet open meadow, 27 November, 1908; 273, very damp meadow, 13 February, 1909; 834, rich soil in meadow, 20 Sept., 1909 — from three different though adjacent spots in Stoughton, taken in connection with the Canton specimens, indicate that this variety is probably fairly well distributed in eastern

Massachusetts. Quite likely it is often taken for *B. ternatum*, var. *intermedium*, with which indeed, so far as can be judged from herbarium series, it seems to intergrade, while at the other end specimens with less and less obtuse pinnules taper off into *B. obliquum*. The examination of much material, both in the Gray Herbarium and my own collection, has practically convinced me that through this form *B. obliquum* and *B. ternatum*, var. *intermedium* inosculate.

Lycopodium clavatum, var. *megastachyon* Fernald & Bissell. On 24 November, 1910, in a grove of *Pinus rigida* in a pasture in Sharon, Massachusetts, I came upon a clubmoss which I recognized as this recently described variety, with which I had become familiar in the summer of 1909 in Hillsboro County, New Hampshire. Of the three sheets collected, one sheet (2026), having nine one-spiked peduncles to one two-spiked, must be called nearly typical *megastachyon*. The other two sheets, which together show seven unispicate and nine bispicate peduncles, are very good intermediates. In the original description this variety was recorded from the western part only of the state.

STOUGHTON, MASSACHUSETTS.

HELIANTHUS SUBRHOMBOIDEUS IN NEW HAMPSHIRE.— On 11 September, 1908, I collected in fruit along the Grand Trunk Railway, about a mile northwest of Gorham, New Hampshire, an unfamiliar composite. A few days later, 23 September, 1908, Mr. A. H. Moore and I found the same species in the Grand Trunk freight-yards at Berlin, New Hampshire, about five miles from the former locality. On 18 July, 1910, the Gorham locality was revisited and the plants were found to have increased considerably in numbers and to be coming into flower. Specimens were sent to the Gray Herbarium where Professor Fernald kindly identified them as *Helianthus subrhomboideus* Rydb., a native of high plains of the Northwest and not hitherto reported from the range of Gray's Manual. The existence of two stations and the tendency of one of them to spread suggest that this species may be expected along the Grand Trunk in adjacent western Maine and northeastern Vermont and that it may become a permanent addition to our flora. Specimens from both stations are in the herbarium of the writer and one from the Gorham locality has been placed in the Gray Herbarium.— ARTHUR STANLEY PEASE, Urbana, Illinois.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— XI.

CYPERACEAE.

ERIOPHORUM.

E. callitrix Cham. Cold bogs; reported from several scattered stations.

E. gracile Roth. Cold bogs and swamps. Nine scattered stations in northeastern and central portions. An early bloomer which has escaped many collectors.

E. tenellum Nutt. Boggy meadows, well distributed.

E. virginicum L. Bogs and wet meadows; common throughout.

E. virginicum L., var. **album** Gray. Danvers (*J. H. Sears*, Sept. 1, 1885); Harland St. meadows, Milton (*J. R. Churchill*, Sept. 1, 1895).

E. viridi-carinatum (Engelm.) Fernald. Boggy meadows and swamps. Not reported from the extreme southeastern portion, but abundant elsewhere.

FUIRENA.

F. squarrosa Michx. Shores of Round Pond, Tewksbury, 1854 (*Wm. Boott*) to the present.

HEMICARPHA.

H. micrantha (Vahl) Pax. Sandy shores of ponds, rare; North Andover, Andover, Winchester, Concord, Wayland, Framingham, Sherborn.

RYNCHOSPORA.

R. alba (L.) Vahl. Meadows and bogs; not reported from the extreme southeastern portion, but abundant elsewhere.

R. alba (L.) Vahl, var. **macra** Clarke. Fresh Pond, Cambridge (*Wm. Boott*, Aug. 20, 1853); Round Pond, Tewksbury (*M. L. Fernald*, Sept. 18, 1909).

R. fusca (L.) Ait. f. Low ground, frequent in northern three quarters of district, doubtless throughout.

R. glomerata (L.) Vahl. Moist soil, abundant throughout.

R. macrostachya Torr. Great Pond, South Weymouth (*Wm. Boott*, Sept. 2, 1870; *E. & C. E. Faxon*, Sept. 19, 1878; *G. G. Kennedy*, Sept. 9, 1908).

R. macrostachya Torr., var. **inundata** (Oakes) Fernald. Great Pond, South Weymouth (*E. Faxon*, Sept. 19, 1878; *G. G. Kennedy*, Sept. 9, 1908).

CLADIUM.

C. mariscoides (Muhl.) Torr. Margins of ponds and wet places, common throughout. Collected by E. F. Williams in a *salt-marsh* at Scituate.

SCLERIA.

S. reticularis Michx. Wet sandy and gravelly shore, Winter Pond, Winchester, from 1858 (*Wm. Boott*) to the present.

S. triglomerata Michx. Open place in dry woods near a dry watercourse, South Sudbury (*W. P. Rich*, Aug. 8, 1899); Concord (*E. S. Hoar*, according to Dame & Collins, Fl. Middlesex Co. 114, 1888).

C. H. Knowlton, J. A. Cushman, Walter Deane, A. K. Harrison — *Committee on Local Flora.*

Three additional Plants from Nantucket.— The following plants may be of interest as not being previously recorded from Nantucket. Specimens of *Polypodium vulgare* L. were found by Miss Grace Gardner of Nantucket last summer. *Corallorhiza maculata* Raf. was found by Mr. Nelson, a Cornell student, who spent the summer on the island. In 1909 I found some patches of *Glaux maritima* L. on Tuckernuck Island and in 1910 found an abundance of it in the marshy area about the south inlet of the Island. It spreads over a large area along the shore and is of the small-leaved typical form. Specimens of these three species are in the herbarium of the Nantucket Maria Mitchell Association at Nantucket.— Joseph A. Cushman, Boston Society of Natural History.

A boreal Variety of Fragaria virginiana.— The plant here considered, though recognized before as a species, seems best treated as a variety as follows: —

Fragaria virginiana Duchesne, var. **terrae-novae** (Rydberg), n. comb. *F. terrae-novae* Rydberg, Mem. Dept. Bot. Columbia Univ. ii. 182 (1898). All the *Fragaria virginiana* from southern Labrador and nearly all from western Newfoundland and northeastern Quebec differs from the typical form of the species in having the pubescence of all the petioles and the scapes closely appressed. In true *F. virginiana* (including *F. canadensis* Michx.) the petioles at least of the earlier leaves have horizontally spreading or even somewhat reflexed pubescence. The typical *F. virginiana* was seen by us in western Newfoundland during the past summer only once (a single individual among the abundant var. *terrae-novae*). Similarly in the Gaspé Peninsula of Quebec the var. *terrae-novae* is everywhere abundant, while the true *F. virginiana* with the petioles divergently pubescent is so unusual that it has been collected as a rarity whenever found. The var. *terrae-novae* is thus parallel in the character of the pubescence with *F. vesca* L., var. *americana* Porter, *Potentilla canadensis* L., var. *simplex* (Michx.) T. & G. and some other well known members of the *Rosaceae*. It is abundant in southern Labrador, ascends on alpine meadows to 1125 m. on Table-top Mountain, Gaspé, on walls of the North Basin of Mt. Katahdin to 1290 m., is found in Oakes' Gulf of the White Mountains up to 1360 m., and is at various stations both inland and coastal in Maine and locally in northern Vermont. In the southern part of its range it passes very clearly to typical *F. virginiana*, plants with both types of pubescence sometimes occurring in the same colonies.— M. L. Fernald and K. M. Wiegand.

Solidago polycephala in Maryland.— While on a collecting trip in Anne Arundel County, Maryland, September 4, 1910, I collected by the roadside between Muirkirk and Contee a *Solidago* of the Section *Euthamia* which did not appear familiar. It seemed to answer to the description of *Solidago polycephala* Fern. given in the seventh edition of Gray's Manual. A comparison of it with the type of *Euthamia floribunda* Greene in the National Herbarium, upon which

Fernald's species is based, furnished conclusive evidence of the identification. The Manual makes the following statement regarding the range of *Solidago polycephala*: "Apparently local, s. N. J. and e. Pa." Although not unexpected in a new or little known species, the extension of range seems worthy of record. It will now be interesting to learn whether it is local in this region also. The species is sufficiently distinct from *S. graminifolia* (L.) Salisb. var. *Nuttallii* (Greene) Fern. by reason of its "uncommonly small heads," [1] or as Fernald [2] expresses it, "by its tiny involucre," and its closely appressed scales, tipped with green. The green color does not seem to me to be quite so significant as has been suggested, for there are not a few specimens of *S. graminifolia* var. *Nuttallii* in the National Herbarium which have just as green tips.— Albert Hanford Moore, Washington, D. C.

Cornus canadensis, var. intermedia in eastern America.— The common bunch-berry, *Cornus canadensis* L., has the leaves ordinarily closely crowded and appearing whorled at the summit of the nearly naked or only slightly bracted stem. In northwestern America, as recently pointed out by Miss Edith M. Farr,[3] the common tendency of the plant is to have on the middle of the stem 1–3 pairs of well developed leaves, which are about one-half or two-thirds as large as the upper leaves. This plant, *C. canadensis*, var. *intermedia* Farr, was earlier described by Ledebour [4] as a species under the name *C. unalaschkensis*, but because of the pale flowers, the tendency to bunching of the upper leaves, and the general similarity of appearance, it seems best to class it as a variety of *C. canadensis*, into which it clearly passes. In Labrador and Newfoundland both *C. canadensis* (typical) and var. *intermedia* occur, and several plants from the northern half of Maine and from New Hampshire, which have been collected with the hope that they might be *C. suecica*, approach var. *intermedia* and suggest that the variety may be confidently sought in northern New England. From *C. suecica*, which the variety somewhat simulates, it is distinguished by having the more acuminate leaves, less uniform in size, the upper definitely larger than the lower and preserv-

[1] *Euthamia floribunda* Greene, Pittonia, v. 74 (1902), not *Solidago floribunda* Phil.
[2] *Solidago polycephala* Fern. Rhodora, x. 93 (May 16, 1908).
[3] Contrib. Bot. Lab. Univ. Pennsylvania, ii. 423 (1904).
[4] Fl. Ross. ii. 378 (1844–46).

ing the crowded or subverticillate appearance as in true *C. canadensis*, while the flowers (the true flowers, not the bracts) are pale as in the latter species, those of *C. suecica* being dark purple.— M. L. Fernald and K. M. Wiegand.

Hottonia inflata a Winter Annual.— Early in December, 1910, while passing a brook at West Hingham, Mass., I was surprised to discover in the icy waters young plants of *Hottonia inflata* Ell. reaching nearly to the surface. The plant would have been easily recognized by its pectinate submerged leaves, even if I had not seen it there in blossom several times in summer. On Dec. 31, 1910, I removed an inch of ice, and gathered specimens from water at the temperature of 39° Fahrenheit. There were no signs of old plants, and the roots of these specimens were soft white cellular fibres, of very recent growth. March 26, 1911, I found that the plants in the brook had made further growth.

From these observations I am convinced that this species is a winter annual, instead of a perennial, as stated in Gray's Manual, Seventh Edition. Britton's Manual and Small's Southern Flora make no reference to the matter.

Apparently the seeds fall from the decaying stalks in late July and August, and soon germinate at the muddy bottom of the stream. The young seedlings must grow rapidly at first, with slight progress during the winter months. In May the inflated flower-stalks begin to grow, and the first flowers appear by the end of the month, reaching their fullest development about June 20. After flowering, the old plants shed the pectinate leaves and decay as the seeds ripen.

I have seen the plant growing also in Amesbury, Belmont, Waltham, Quincy, Holbrook, and Abington.— Clarence K. Knowlton, Hingham, Massachusetts.

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1. Blanc Sablon from the eastern terraces.

2. Old Stump on the Tablelands east of Blanc Sablon.

Rhodora

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY.— NEW SERIES, NO. XL.

A BOTANICAL EXPEDITION TO NEWFOUNDLAND AND SOUTHERN LABRADOR.[1]

M. L. FERNALD.

(Plates 86–91).

PART I. JOURNAL OF THE EXPEDITION.

IN recent years few lands have figured more prominently in our American papers and in our treaty negotiations than Newfoundland, the oldest of Great Britain's colonial possessions, the largest island in the western hemisphere and, with the exception of Great Britain herself, the largest island in Altantic waters. Nevertheless, although many other British colonies have had their vascular floras adequately worked out in such classic publications as Bentham's *Flora Australiensis* (7 vols.), Hooker's *Flora of British India* (7 vols.), Hooker's *Flora Tasmaniae*, and Grisebach's *Flora of the British West Indies;* and the French islands of St. Pierre and Miquelon, immediately south of Newfoundland, have their *Florule des îles Saint Pierre et Miquelon* by Bonnet and the *Flora Miquelonensis* by Delamare, Renauld & Cardot; Newfoundland has been left to shift for herself.

It is true that several collections have been made upon the island — by Sir Joseph Banks [2] and by John Fraser in the second half of the 18th century; by Bachelot de la Pylaie, Cormack, Miss Brenton and

[1] Read at the meeting of the New England Botanical Club, March 3, 1911.

[2] See James Britten, Journ. Bot. xlii. 84 (1904).

others early in the 19th century; by Dr. John Bell, Dr. Robert Bell, Henry Reeks, Professor Roland Thaxter, J. D. Sornborger, and numerous others [1]; but upon some of these collections no publications have been based, while others have been the bases for comparatively brief lists. La Pylaie undertook the preparation of an elaborate *Flore de Terre-Neuve et des Iles Saint-Pierre et Miclon* with illustrations drawn from living plants, but only our section, devoted to *Algae*, was issued.[2] In 1825, however, he published a little book, *Voyage à l'ile de Terre-Neuve*, giving a journal of his explorations and many notes on the vascular plants and their distribution, publishing several new but undefined names, and recording numerous species of more than usual interest: *Schizaea pusilla* (*S. filifolia* La Pylaie) "dans certaines parties de ces bas-fonds. . . .qu'on nomme *Swamps* dans l'Amérique septentrionale"; *Salix reticulata* on the barrens by Ingornachoix Bay; "*l'Alchemilla officinalis*, dans le partie inférieure des coteaux" of Quirpon Island; and many others which may be discussed at another time. William E. Cormack published an account of his journey made in 1822 across the island from Trinity Bay to Bay St. George and made notes upon some of the plants seen. His account, reprinted in 1873,[3] is rare even in its reprinted form and the plants enumerated, often under unintelligible names, are chiefly the commoner species. Reeks published a somewhat pretentious list of the vascular plants [4] based upon his observations on the west coast, and proposed three new species which were overlooked by the editors of *Index Kewensis* — a *Viola* of the *blanda* group, a *Euphrasia* which was collected in quantity last summer at the type locality and which is uncomfortably near our New England *E. Randii*, and an *Iris* which is clearly *I. setosa*, var. *canadensis*. Reeks's collections, so far as known, were not preserved and his list contains many entries extremely doubtful until the past summer and others which are obvious errors of determination. Dr. John Bell published a very readable account [5] of his trip made in June and July, 1867, and noted some of the commonest plants, with a few which are certainly rare or

[1] For further notes see Robinson & Schrenk, Can. Rec. Sci. vii. 4, 5 (1896).

[2] Paris, 1829.

[3] W. E. Cormack: Narrative of a Journey across the Island of Newfoundland. Reprinted by Moses Harvey (St. John's, 1873).

[4] Henry Reeks: A List of the Flowering Plants & Ferns of Newfoundland with Metereological Observations (Newbury, England, 1873).

[5] John Bell: The Plants of the West Coast of Newfoundland. Can. Nat. ser. 2, iv. 256–263 (1869); v. 54–61 (1870).

local on the island — *Claytonia caroliniana* from a mountain side south of the Great Cod Roy River; *Dryopteris fragrans* from Cairn Mountain; *Epilobium latifolium* from Flat Bay Brook and Grand Lake — and several which were surely misidentified.[1] Dr. Robert Bell's collections made in southeastern Newfoundland in 1885 were the basis of a list (102 vascular plants) by Professor John Macoun.[2]

The largest collections made upon the island by a resident were those of the late Rev. Arthur C. Waghorne who in his missionary work travelled widely and is now remembered at many of the fishing ports of both Newfoundland and Labrador, where he often dried his pressing papers by the kitchen fires. Mr. Waghorne collected rather extensively and his specimens (poorly prepared and labeled in a crabbed and often illegible hand and determined with varying degrees of accuracy) are found in several of our larger herbaria, but the major part of his collections are now deposited with the Geological Survey of Newfoundland. Toward the end of his life Mr. Waghorne had issued three parts (*Polypetalae* and *Gamopetalae*) of his *Flora of Newfoundland, Labrador and St. Pierre et Miquelon.*[3]

Of a more satisfactory character both as to specimens and determinations are the large collections of the past two decades made by three parties of American botanists. In 1894 Drs. Benjamin L. Robinson and Hermann von Schrenk spent the summer collecting in the Avalon Peninsula, with a short side trip to the lower Exploits River. Upon their extensive collections they based a 29 page report published in 1896.[4] In 1901 the New York Botanical Garden sent an expedition to Newfoundland. The members of the party, Messrs. C. D. Howe and W. F. Lang, were algologists but they supplemented their collections of Algae by a large series of vascular plants. So far as I am

[1] Dr. Bell's *Vallisneria spiralis* which the waves "rolled in quantities" on the beach of Bay St. George was certainly *Zostera marina*, his *Viburnum Lentago* must have been the common *V. cassinoides* which he does not mention, his *Cirsium pumilum* from "The Gravels" was undoubtedly a form of *C. muticum* (probably var. *monticola* which is common in western Newfoundland), his *Aspidium marginale* from Bay of Islands was unquestionably the there common *A. Filix-mas*; and there is grave doubt of the occurrence in Newfoundland of such plants, mentioned by him, as *Asplenium thelypteroides*, *Salix petiolaris*, *Betula lenta*, *Thalictrum dioicum*, *Lonicera oblongifolia*, and *Viburnum acerifolium*.

[2] John Macoun: List of Plants collected in Newfoundland in 1885 by Dr. Robert Bell. Geol. Surv. Can., Ann. Rep. n. s., i. 21–25 D D (1886).

[3] Waghorne, Trans. Nova Scotia Inst. Sci., ser. 2. i. 359–375 (1893), ii. 17–34 (1895), ii. 361–401 (1898).

[4] Robinson and von Schrenk: Notes upon the Flora of Newfoundland, Can. Rec. Sci. vii. 3–31 (1896).

informed, no special publication has ever been made upon their collection of flowering plants and ferns. In July and August, 1908, two members of the New England Botanical Club, Drs. Edwin H. Eames and Charles C. Godfrey, spent nearly a month in southwestern Newfoundland, between Port aux Basques and the Bay of Islands, bringing back about 400 species, 50 of them previously unknown from the island. Their results were published in Rhodora [1] for May, 1909.

This, so far as I am aware, summarizes briefly the more important botanical work in Newfoundland up to the past summer. The reasons for this rather meagre record are numerous and, when we look into the history of the colony and realize that until very recently the people of the island have all depended upon the sea, readily understood. But I imagine that with most of us who spend our summers on shore one of the most important reasons for neglecting Newfoundland has been a failure to appreciate how readily accessible is this island of *Terra Nova* which has so long remained to botanists a *Terra Incognita* as well. Few of us realize that Newfoundland is about 350 miles across from east to west and approximately the same from north to south (farther than from Boston to Quebec or about as far as from Boston to Baltimore) and contains 42,200 square miles; i. e. is larger than the island of Cuba or two thirds as large as New England. When this immense area is taken into account it will be readily admitted that, in spite of the notes already published, the flora of Newfoundland as a whole has been among the least known of any flora in civilized America.

And so, in the hope of learning something more of the region and of comparing the flora with that of the mainland and Anticosti Island on the western side of the Gulf of St. Lawrence, the expedition of 1910 was organized. I was fortunate in having as companions Professor Karl M. Wiegand, who had accompanied me on a previous summer's campaign, Mr. Joseph Kittredge, Jr., one of my students, who went as general assistant but soon proved so efficient that he was doing original exploring, and Mr. Alfred V. Kidder, an archaeologist and ethnologist, who represented the Peabody Museum of Harvard University.

Our first sight of Newfoundland was the conventional one, but none the less thrilling and picturesque. Upon rising early on the morning

[1] E. H. Eames: Notes upon the Flora of Newfoundland, Rhodora, xi. 85–99 (1909).

of July 3d as the "Bruce" (now lying at the bottom of Cabot Strait) approached Port aux Basques we gazed with delight upon the great granitic tablelands, their summits and slopes so covered with snow and ice that it was difficult to realize that less than two days before we had left New England sweltering in untempered heat and dust. So here, at our first landing on the island, we almost regretted that we had ticketed through to the Bay of Islands (140 miles north of Port aux Basques), for surely no country could be more tempting to a botanist from farther south nor hold out more hope of boreal plants than this first spot to meet our expectant gaze. But the train would not wait for us to climb the mountains so, making mental note that we must return to explore the region of Port aux Basques and the Cape Ray Mountains, we entered the dining car and had breakfast while the train was surging along winding valleys and around hills or making its way across the less treacherous parts of extensive moors and bogs. By the time breakfast was over and we settled down to uninterrupted observation of the landscape we had passed under more snow-covered tablelands and were following the western flank of the Long Range through the Carboniferous sandstones north of Cape Ray. The region was in places heavily forested, but with occasional extensive bogs which increased in abundance and area as we approached the coast. From the train they seemed exactly like our New England sphagnum bogs, except that there *Arethusa* grew in close colonies forming brilliant spots, as if pots of fifty or more finely flowered plants were set here and there upon the barren; the wet places were often densely carpeted with the little dwarf birch, *Betula nana* L., var. *Michauxii* (Spach) Regel;[1] and there were great carpets bright copper-colored with a cotton-grass which I recognized as my own *Eriophorum callitrix,* var. *erubescens,* a beautiful plant which was thus far known only from Newfoundland and which I had seen only in the herbarium. Such bogs, covered with the *Eriophorum* and the *Betula,* soon began the tantalizing habit, as it seemed to us, of appearing whenever the train whistled for a station but just as regularly disappearing before the station was actually reached. We kept up a continuous "hide and seek" with the *Eriophorum* and the *Betula* for some hours but were unable to catch them near a railway station,

[1] In this paper the authors of species and varieties are given only for such plants as are not included in Gray's Manual, ed. 7.

so we finally solaced ourselves with the thought that they were so abundant that we should find them about the Bay of Islands. But, after we had followed this type of country for seventy-five miles so that we were beginning to think of it as typical Newfoundland, there was a sudden change. The broad open bogs or barrens with scattered Black Spruce and Larch and with the *Eriophorum* and *Betula, Arethusa, Sarracenia, Rubus Chamaemorus*, and *Andromeda*, abruptly gave way to a beautiful dense forest of White Spruce with open park-like glades and springy meadows, with now and then a white mass which we recognized as *Salix candida*, or a clump of pink and white Showy Ladies' Slipper (*Cypripedium hirsutum*). Upon comparing the time-table and Howley's geological map, which quickly became our "guide, philospher and friend" for the summer, it was obvious — just as if the abrupt change in vegetation were not in itself sufficient evidence — that we had left the Carboniferous sandstone area and had entered the Silurian limestones which extend from here to the Bay of Islands and far beyond. Soon after passing St. George's Pond we caught fleeting and thrilling glimpses over the forested valleys of treeless reddish-brown slopes in the West, just like Mt. Albert as one sees it from the East, and we knew, as already indicated by Murray's geological reports and Howley's map, that we should soon be exploring serpentine mountains like those of Gaspé.

After leaving the head of Bay St. George we had seen no towns — only camps and occasional log-cabins — but suddenly emerging from among the Silurian hills we came unannounced upon the Bay of Islands with its prosperous and picturesque town, Birchy Cove. Our headquarters were to be at Petrie's which proved to be a comfortable house on a point reached ordinarily by walking a mile back on the track, but on such occasions as this — a first arrival — by motor boat. Here we found a comfortable home for the summer, with a kind host and hostess and interesting and friendly people at table, and we soon had a work-room equipped and in active use. We had entrusted, a week before we ourselves started, our drying paper, collecting boxes, waterproof clothes, tramping shoes and such other articles as we most needed to the mercies of our old acquaintance, the American Express Company, and this time some brilliant wag had shipped them from Cambridge to Newfoundland by way of Montreal! So during a four days' wait we attempted to explore in our travelling shoes, a programme which on the first day wrought havoc with them, for in

western Newfoundland, and apparently elsewhere on the island, as soon as one leaves the beaten path he is either in a saturated bog or on hard and ragged ridges. Our first few days were consequently occupied in gaining a general knowledge of the region and in picking out spots for more thorough exploration. Immediately around Birchy Cove the woods have been terribly destroyed by forest fire, exposing baked ledges over thousands of acres, and of course in such soilless spots the botanizing was practically spoiled. Similarly, along the roadsides the sheep had browsed so closely that there was little hope there, but we soon discovered unspoiled slopes and mossy woodland glades which exhibited a flora suggesting that of Aroostook County, Maine, or Bonaventure and Gaspé Counties, Quebec, with the abundance of *Selaginella selaginoides, Habenaria dilatata* and *hyperborea, Cypripedium hirsutum, Carex gynocrates, vaginata,* and *castanea, Tofieldia glutinosa, Geum macrophyllum, Osmorhiza obtusa, Pinguicula vulgaris,* and *Galium labradoricum*; but for some reason, after all, these rich mossy woods of the Silurian hills were quite unlike those of the Silurian region of northern Maine and adjacent Canada, and after many excursions we found out why. There is no Arbor Vitae (*Thuja occidentalis*) in Newfoundland and consequently there are no Arbor Vitae swamps such as we find so generally in our northern calcareous regions; and as the summer passed we were more and more impressed with this singular desideratum, for the absence of Arbor Vitae seems to deprive the island of many of the plants we find so abundantly in its shade: in Newfoundland we watched in vain for *Equisetum pratense, Orchis rotundifolia, Calypso bulbosa, Corallorhiza striata, Pyrola asarifolia, Lonicera involucrata, Valeriana uliginosa,* and *Senecio discoideus,* which on the Gaspé Peninsula are so generally found in the humus of the Arbor Vitae swamps.

But we were not looking simply for familiar plants; and, although the absence of many which we confidently expected was a surprise and opened our eyes and minds to a problem not previously considered, there were plenty of good things to be collected. Many springy places and brook-beds were filled with a dense tangle of a sprawling plant with white clammy pubescence and brilliant yellow flowers, *Mimulus moschatus,* much commoner in the Rocky Mountain region than in the East. The thickets and open woods had tall clumps of a *Scrophularia* strange to us of New England — true *S. nodosa* L., apparently identical with the plant of Europe. In the woods also

were great clumps of *Dryopteris Filix-mas* and *Polystichum Braunii*, with here and there *P. Lonchitis* on the shaded limestone shingle. *Vaccinium ovalifolium*, abundant from Alaska to California and also on the Shickshock Mts. of Gaspé, was common on the hill-tops, as was *Galium kamtschaticum* in cold ravines; and typical *Valeriana sylvatica* Banks (smaller in all parts than our *V. uliginosa*) was occasionally found. Singularly enough each bog and wet woodland glade seemed to have its own specialty: in one *Bartonia iodandra*, a species known only in Newfoundland and Cape Breton; in another *Utricularia clandestina*, heretofore unknown east of New Brunswick; in another a perplexing *Euphrasia*, *Rhinanthus*, or *Senecio*. Along the railway were strange weeds, the most interesting of them perhaps being the Fairy Flax, *Linum catharticum*, with white flowers and opposite leaves, both unusual characters in the genus, and the handsome thistle, *Cirsium palustre*, which was afterward seen at points more than fifty miles apart.

Upon the arrival of our driers, presses and old clothes, it was decided that Kidder and I should undertake a trip across the Island by way of the East Branch of the Humber River and Indian Brook to Notre Dame Bay. We went by train to a point east of Howley whence we could easily reach the Humber system at the Goose Ponds. This region was in the midst of a Carboniferous sandstone area, and I was delighted to find myself actually camping on a sandy and boggy barren such as we had so long watched from the train between Cape Ray and the head of Bay St. George. Here was the flora we had seen from the train, but quite unlike that of the calcareous Silurian region about the head of the Bay of Islands. Except for the nearly endemic *Eriophorum callitrix*, var. *erubescens* Fernald and *Betula nana* L., var. *Michauxii* (Spach) Regel and the everywhere abundant *Calamagrostis Pickeringii*, we might have been on the barren coast of eastern New England, and the chief botanical excitement came from adding to the list of Newfoundland plants such treasures as *Dryopteris cristata*, *Lycopodium clavatum*, var. *megastachyon* Fernald & Bissell,[1] *L. complanatum*, *Scheuchzeria palustris*, *Panicum implicatum*, *Carex trisperma*, var. *Billingsii*, *C. polygama* and *limosa*, *Listera auriculata*, *Salix lucida*, var. *intonsa* and *S. pedicellaris*, var. *hypoglauca* Fernald[2]; while I tried to rouse enthusiasm over *Pinus resinosa*,

[1] Rhodora, xii. 53 (1910). [2] Rhodora, xi. 161 (1909).

Carex debilis, var. *Rudgei*, *C. intumescens*, *Eriocaulon septangulare*, *Salix humilis*, *Populus tremuloides*, *Pyrus arbutifolia*, var. *atropurpurea*, *Ilex verticillata*, *Vaccinium macrocarpon*, *Melampyrum lineare* and *Diervilla Lonicera*. This long list is given, obviously not to display any botanical richness of the region, but because in our whole summer's experience most of these common plants of sterile coastal New England were nowhere encountered except in the sandstone areas of central Newfoundland and of Bay St. George or occasionally on the most sterile summits of hills and mountains. About Sandy Lake are dunes and sandy beaches covered with *Elymus arenarius* and *Juniperus horizontalis*, quite like a silicious coastal strip of eastern New England, but here in the very heart of Newfoundland.

We climbed one of the higher granite mountains of the interior, Mt. Steepmore (or Seemore) but it had little to add to what was on the lower barrens, except *Festuca ovina*, var. *brevifolia*, *Carex scirpoidea* and *deflexa*, *Juncus trifidus*, *Empetrum nigrum*, var. *purpureum* (with small coral-red berries), *Loiseleuria procumbens*, *Arctostaphylos alpina* and *Diapensia lapponica*. In one of the Birchy Ponds at its base was the most beautiful pondweed imaginable, *Potamogeton praelongus*, forma *elegans* Tiselius, a form described from Scandinavia, with delicate translucent leaves almost a foot (3 dm.) long.

A combination of mishaps, head winds, and ineffective guide forced us to turn back before reaching the eastern coast and, after waiting half the night in a peat-bog for the freight train due at 3 o'clock in the afternoon and which we stopped by waving a fire-brand, we reached headquarters in time to see Wiegand and Kittredge starting in the early morning for a three days' trip to the Marble Mountain region of the Humber River. They returned in due time heavily laden with a good collection of calciphiles, among them *Polystichum Lonchitis*, *Carex eburnea*, *Tofieldia palustris*, *Microstylis monophyllos*, *Salix vestita* Pursh, *Arenaria verna*, var. *propinqua*, *A. litorea*, a species probably long ago found in Newfoundland and reported by Pursh as *A. juniperina* (see Rhodora, viii. 34), *Thalictrum alpinum* L., *Anemone parviflora*, *Draba arabisans*, *Saxifraga Aizoon*, *aizoides*, and *oppositifolia*, an *Alchemilla*, *Erigeron hyssopifolius*, and *Taraxacum ceratophorum* (Ledeb.) DC., mostly species which had been recorded by la Pylaie and which we afterward found to be common enough on all the exposed limestones of the West Coast, but certainly a refreshing contrast to the commonplace collection which had come back from the sandy barrens and bogs of Goose Pond and Sandy Lake.

The next move was a double one, Wiegand and Kidder taking the "Home" north to Cow Head in the Silurian limestones north of St. Paul's Bay, Kittredge and I making a first attack upon the serpentine barren which, five miles west of Birchy Cove, forms the northeastern flank of the Blomidon (with some propriety corrupted to "Blow-me-down") Range. We went with keen anticipations, for this serpentine barren from the distance looked so like a reduced Mt. Albert that we felt it inevitable that it should yield the plants which in Gaspé distinguish the serpentine from all the other mountains. And we were in no way disappointed. Here was Mt. Albert all over again; and during the whole summer we did not have a closer day's work than on that single day in late July when, starting soon after sunrise, we tramped in to the mountain from Benoit's Cove in a heavy thunder storm which rendered more obscure an overgrown trail, climbed up to the tableland (plate 87, fig. 3) botanizing all the way, came down over a snow-field at the risk of our lives as it proved, thus teaching us a valuable lesson in mountaineering, and returned before dark five miles through the woods to Benoit's Cove. Our boxes and rück-sacks were crowded full and Mr. Albert,[1] the great serpentine tableland of Gaspé, will be suggested in the plants we had found: *Adiantum pedatum* L., var. *aleuticum* Rupr., first recognized in eastern America on Mt. Albert, occurring in the Selkirks, according to Professor F. K. Butters, only on a serpentine ridge, and similarly, according to Professor John Macoun, found on Vancouver Island only on the serpentine or other magnesian rocks; *Danthonia intermedia* Vasey, unknown elsewhere in the East except on Mt. Albert; *Festuca scabrella* Torr., recently confused with *F. altaica* Trin. and heretofore known in eastern America only on Mt. Albert where it abounds; *Lychnis alpina* L., otherwise unknown south of Labrador except on Mt. Albert and along Coal or Serpentine River in Newfoundland, which takes its name from the serpentine rocks of the Blomidon Range and the Lewis Hills; *Arenaria arctica* Stev. (ditto); *Arenaria ciliata* L., var. *humifusa* Hornem. (ditto), a plant identical with *A. norvegica* Gunn. which in the British Isles has but two stations, one in the Orkneys (soil not stated), the other on a serpentine hill on one of the Shetland Islands[2]; *Statice sibirica* (Turcz.) Ledeb. (Mt. Albert)

[1] See Rhodora, ix. 155, 158, etc. (1907).

[2] See Edmundston, Flora of Shetland, xv (1845); also Syme, English Bot. ii. 104 (1873), where it is stated (105) that *A. ciliata* (true) occurs on calcareous cliffs.

3. Northeastern Tablelands of the Blomidon Range, looking across the Gorge of Blomidon Brook from the treeless Serpentine to the wooded Diorite area.

4. Dry limestone Barren, western edge of Table Mountain, Port à Port Bay.

and *Solidago multiradiata* Ait., the common Arctic American representative of the *Virgaurea* group.

We were still putting our exciting collections into press when the "Home" returned from the North bringing Wiegand with his Cow Head material — practically all the calciphiles of the Humber River marbles and some not met before: *Botrychium Lunaria*, a species which abounds locally in calcareous gravels and beaches or on damp turfy slopes around much of the Gulf of St. Lawrence, often attaining splendid proportions (2–2.5 dm. high, with the sterile lamina 6–7 cm. long); *Poa alpina* and *P. eminens*, two of the handsomest of the genus; *Salix Pseudo-myrsinites* Anderss., a frequent species in the Canadian Rockies and on the Gaspé limestones; one of the puzzling Scurvy Grasses (*Cochlearia anglica* L.); *Draba incana* L. and its var. *confusa* (Ehrh.) Poir. which are familiar to those who have been at Percé in eastern Quebec; *Arabis alpina* L.; *Saxifraga caespitosa* L.; *Parnassia parviflora; Oxytropis campestris* DC., var. *caerulea* Koch, a singularly misnamed plant since its flowers are crimson or "rose-purple" and, like those of many other *Leguminosae*, become blue only when dry; and *Hedysarum alpinum* L., a larger-flowered plant than our variety [1] of Gaspé, the St. John River, and Willoughby, which, as maintained more than a century ago by Michaux and more recently by Fedtschenko [2] and by Ostenfeld,[3] certainly cannot be separated specifically from the Siberian *H. alpinum*. But the plant which upon first discovery was most interesting was a beautiful blue gentian, new to us as well as to the Gray Herbarium, *Gentiana nesophila* Holm, a species heretofore supposed to grow only on Anticosti, but after our first introduction found to be a common plant on the limestones of western Newfoundland as far north and south as we explored — Pointe Riche at the north, Port à Port at the south. In fact this gentian, which abounds on the limy gravels and in damp spots about Ingornachoix Bay and the foot of Bay St. John, was undoubtedly seen by la Pylaie who in that region found "une gentiane voisine du *pneumonanthe*."

Now came the longest flight, the whole party like the Newfoundland fishermen migrating to the Labrador — not very far into Labrador, but north of the Straits of Belle Isle and east of the Canadian bound-

[1] *Hedysarum alpinum*: *americanum* Michx. Fl. ii. 74 (1803). *H. boreale* Nutt. Gen. ii. 110 (1818). *H. americanum* Britton, Mem. Torr. Bot. Cl. v. 201 (1894).

[2] Fedtschenko: Generis Hedysari revisio. Act. Hort. Petrop. xix. 253–258 (1901).

[3] Ostenfeld: Vascular Plants collected in Arctic North America by the Gjöa Expedition. Vidensk. Selsk. Skrift. I Klasse, No. viii. 55, 56 (1909).

ary. In earlier days the name Labrador was used in a general way for the entire peninsula north of the lower St. Lawrence and the Gulf, but in 1876 the jurisdiction of the Government of Newfoundland was defined as that portion of the Labrador Peninsula lying east of a line drawn directly north from Blanc Sablon to 52° N. latitude, thence along the height of land to a point on the mainland-shore nearly south of Port Burwell, Cape Chudleigh. West of this boundary the region is Canadian, the southern tract being Saguenay County, Quebec, the northern Ungava. Many of the older collections made on the Labrador Peninsula prior to this delimitation, and a few more recent ones, from west of Blanc Sablon River are designated as coming from "Labrador" and upon such specimens many so-called Labrador records have been made and new species based — for example, *Calamagrostris labradorica* Kearney, the type from Bonne Espérance, Saguenay County, Quebec, and *Galium labradoricum*, deriving its name from an old specimen presumably from the North Shore of the River or Gulf of St. Lawrence. If we wish our geographic citations to be as generally intelligible as possible it seems wisest to refer to the regions in the Canadian portion of the Peninsula by the most definite designations available (Saguenay County, etc.) and to reserve the name Labrador in its restricted sense (as opposed to the more general Labrador Peninsula), as is done in most if not all up-to-date atlases, for the outer coastal strip of the Peninsula.[1] In these

[1] I have been criticized by at least one student of Natural History for accepting the political boundary and restricting the use of the term Labrador to the Newfoundland dependency, labeling specimens from west of the Blanc Sablon River as from Saguenay County, Quebec. In so doing, however, I simply aim at clearness of record. No one whose daily work brings him the constant annoyance of trying to settle beyond doubt whether many old specimens, often the type-specimens themselves, labeled "Oregon," "Missouri," or "Northwest Territory," really come from Washington, Oregon, Idaho, or western Montana; eastern Montana, Wyoming, Colorado, or some region between the Rocky Mountain states and the Mississippi River; or, in case of Northwest Territory, from one of the Canadian provinces of Manitoba, Assiniboia, Saskatchewan, etc., or even one of our Great Lake states — no one whose daily work is interrupted by the necessity of tracing out the sources of old and obscurely labeled specimens can fail to grasp at every restricted use of a geographic name which makes for simplicity and clearness in citation. In fact, for those who wish to cite exact localities it would be a great advantage if the Labrador Peninsula were subdivided into many more clearly defined districts, for the divisions, Newfoundland Labrador, Ungava, and Saguenay County, Quebec, are all too large for the ready localization of a given point. Thus if we have a plant or other specimen from "Esquimaux Island, Labrador" we are entirely in doubt, unless there is a record of the collector's travels (which most busy people should not be required to look up) whether the specimen came from one of the Mingan Islands (north of Anticosti) in Saguenay County, Quebec, from the famous island at the mouth of Esquimaux River, near the Straits of Belle Isle (also in Saguenay County), from the island in Hamilton Inlet, or from one of the other islands along the coast of the Atlantic, Ungava Bay, or Hudson Bay which were formerly the rendezvous of this now almost extinct race.

notes the official boundary is recognized as it is in the most pretentious publication yet available upon the flora, Delabarre's Report on Botany in his *Report of the Brown-Harvard Expedition to Nachvak, Labrador.*[1]

In the latter work, which in 1902 enumerated all the plants seen on the coast of "Labrador proper" during the summer of 1900 by Professor Delabarre, nearly 200 vascular plants were listed. The work which may yet be accomplished by trained and discriminating explorers is shown by the fact that in Wiegand and Kittredge's one day at Forteau and my five botanizing days at Blanc Sablon, where I once more had the genial companionship of Kidder (principally absorbed in gathering Esquimaux arrow-heads), 331 species of flowering plants and ferns were collected, and of these more than 200 are not in Delabarre's list.

As just intimated, Wiegand and Kittredge went to Forteau, Kidder and I to Blanc Sablon. This division of the party was made in order to compare these two regions having similar geological and geographical conditions, which will become clear by a brief description of Blanc Sablon and the neighboring coast. West of the Straits of Belle Isle the entire north shore of the Gulf and the lower River St. Lawrence is composed of Laurentian gneiss and allied rocks, except at the Mingan region, which is limestone. But the words of Sir William Logan describe the general conditions with authority: "Between this exposure [the Mingan Islands] and Bradore Bay, the distance is about 300 miles. The shore, which is very much indented by bays and inlets, and fringed with a multitude of islands, presents an almost continuous line of bare rock; but in no part of it have there been observed any strata, but such as belong to the Laurentian series. On the east side of Bradore Bay, which is situated near to the entrance to the Straits of Belle Isle from the Gulf of St. Lawrence, the palaeozoic rocks again present themselves. Resting on the Laurentian gneiss, they run along the north coast for nearly eighty miles, with a breadth of probably ten or twelve miles."[2] At Blanc Sablon (plate 86, fig. 1) the flat country through which the river runs is a floor of Laurentian gneiss, in many places converted to shifting sand. Each side of the river the Cambrian limestones and calcareous sandstones rise as five terraces until at an altitude of about 350 feet (115 m.) they reach the tableland which stretches west or east and north

[1] Delabarre, Bull. Geogr. Soc. Phila. iii. 167–201 (1902).
[2] Logan, Canadian Geology, 287 (1863).

until cut through by other streams. Here was an ideal place to study the vegetation of a highly calcareous region side by side with the plants of a silicious and gneissoid area, and if anyone doubts the dissimilarities of these floras he can find no better spot in which to undeceive himself than at Blanc Sablon. And if he is received with the hospitality and desire to make his stop successful which were extended to us by our wide-awake host, Mr. Edwin G. Grant, manager of the cod-fishing "room," and his son and daughter in their large and comfortable summer residence — more than a hundred years old, but with electric push-buttons, typewriter and other signs of contact with the world not looked for on the Labrador as ordinarily described; or if he is entertained as we were by Mr. Grant's friendly rival and neighbor, Mr. Thomas Morel, manager of the fishery on the Canadian side, and his good wife, with pictures and accounts of their home in Jersey, with music and discussions of European galleries and theatres, and with lettuce salad dressed with real Jersey cream and a sight of their garden with a patch of carefully sheltered cucumbers coming on; he will feel that the open-handed hospitality which we read of in early accounts of the Hudson Bay Company is equally dispensed by the Labrador fisherman.

The botanizing at Blanc Sablon furnished such an embarrassment of riches that it is now possible to mention only a few characteristic plants. As representative a day as any was Saturday, August 6, the last field-day I had there. Starting from the settlement on the Labrador side, where the shore is bordered by a broad strand-terrace of gneissoid gravel and sand covered by a broad belt of Strand Wheat (*Elymus arenarius*), with *Catabrosa aquatica*, *Montia lamprosperma* Cham.,[1] *Stellaria crassifolia*, and *Ranunculus hyperboreus* Rottb., a little creeping buttercup with only 3 lemon-yellow petals, in the damp hollows, I made my way through the group of Esquimaux dogs, which all summer hang about the fishery, across the sandy and rocky plain which extends from the river to the terrace-slope. As I remember writing home, the *commonest flower* of these Laurentian plains is *Carex rariflora*, though with singular regard for its specific name it is by all means the rarest of its genus in New England. In some places on the drier part of the plain the turf was composed of *Carex stylosa* C. A. Meyer, an Alaskan species which, like many other Alaskan plants, reappears along the Straits of Belle Isle. In the

[1] See Fernald & Wiegand, Rhodora, xii. 138 (1910).

sand-blows were *Luzula spicata* and a viviparous form of *Festuca ovina* L., var. *supina* (Schur.) Hack., subvar. *pubiflora* Hack., and here were the common plants of the granitic barrens of Newfoundland, Gaspé, or northern New England: the Whortleberry (*Vaccinium uliginosum*) the Bearberry (*Arctostaphylos alpina*), the Curlew-berry (*Empetrum nigrum*) both the typical black-fruited plant and the var. *purpureum* with bright coral-red berries, Baked Apple (*Rubus Chamaemorus*), Dewberry or Plumboy (*Rubus arcticus*), Partridge-berry or Red Berry (*Vaccinium Vitis-Idaea*, var. *minus*) and *Loiseleuria, Diapensia, Betula glandulosa, Salix Uva-ursi*, etc. The bogs were everywhere brilliant with Cotton Grasses, *Eriophorum angustifolium, gracile, tenellum* and *callitrix*, but handsomest of all the splendid bronze-topped *E. Chamissonis*, and, its known range now extended across from Newfoundland, the recently described *E. callitrix*, var. *erubescens* Fernald. Coming now to the head of a cove the trail passed back of the Strand Wheat, with here and there a colony of the crimson *Rumex occidentalis* or of some perplexing *Epilobium*, clumps of the handsome sunflower-like *Senecio Pseudo-Arnica*, the splendid whitish-green grass, *Poa eminens*, and the bronze-purple *Calamagrostis lapponica* (Wahlenb.) Hartm., like *C. neglecta* with very long spikelets, and soon reached the foot of the limy terraces.

Immediately the vegatation changed. The brooks tumbling and interlacing every few rods along the slopes from the summit-tableland were bordered by a luxuriant thicket of coarse herbs and low shrubs which, in early August, made as rich an alpestrine meadow as one could well imagine. Here was a tangle as high as one's head, with *Salix candida, S. vestita* Pursh, *S. Pseudo-myrsinites* Anderss., and several variations of *S. cordifolia* Pursh, strange Goldenrods and Asters, *Angelica atropurpurea, Heracleum lanatum*, and a strange villous *Urtica* composing the taller thicket. In making my way up the course of one of these brooks to the crest I encountered more than 175 species of vascular plants, surely a good number for one day's collecting on a Labrador meadow and one difficult to match in our more amiable climates. The brook-margins and moss-bordered rills were everywhere brilliant with Marsh Marigold (*Caltha palustris*) still in bloom, with white masses of *Arabis alpina* L., looking almost exactly like our garden species, the Old World *A. albida*, golden spires of the boreal Yellow Rocket (*Barbarea orthoceras* Ledeb.[1]) and blue

[1] See Rhodora, xi. 140 (1909).

carpets of the northern Speedwell (*Veronica humifusa*), while a beautiful gray-green Ladies' Mantle (*Alchemilla* sp.) made a misty fringe at the edge of the tumbling waters. Occasionally in the wet moss there was a delicate carpet of *Cystopteris montana* (Lam.) Bernh., suggesting a compromise between a broad-fronded *C. bulbifera* and a stockily developed *Phegopteris Dryopteris*; or a colony of *Pinguicula vulgaris* with rich voilet flowers, ordinarily mingled with various Saxifrages and Drabas or the little white *Parnassia Kotzebuei* C. & S. (of southern Labrador, the Gaspé Peninsula, and the Alaskan area). On the exposed rocks at the crests of the terraces were great colonies of Cerastiums, differing from any we had got in Newfoundland and adding two more to the plants we had already collected which, by matching in the herbarium, we are forced for the time being to call vaguely "*Cerastium alpinum*." Occasionally in more open springy spots there were strange sedges and rushes: the chestnut-colored *Kobresia caricina* Willd., its range in eastern America now extended south from Greenland, or *Juncus triglumis* L., an extremely neat little species suggesting *J. stygius*. Near the top of the upper terrace was a meadow crimson and orange-scarlet with *Senecio pauciflorus* Pursh which has discoid heads, the involucre crimson-tinged, the corolla-lobes orange-red, and the anthers yellow.

I had hardly reached the crest at supper time and before turning back could have only the sad satisfaction of seeing for myself that beyond for miles stretched an alluring and to botanists unknown area of alpine meadows, bogs, pools and dry ridges which the approaching night and the call to supper, not to mention the serious difficulty of carrying more plants, forced me to leave until "next time." Returning to the plain, I descended the terrace by a new route, haunted by the consciousness that I was passing by innumerable good things, but stopping only once in the hasty descent to gather a conspicuous lilac-flowered *Erigeron*, the new *E. acris*, var. *oligocephalus*,[1] and again to look over some brackish rocks along shore. Here was a Scurvy Grass (*Cochlearia officinalis* L.) in splendid development, flowering and fruiting plants and new rosettes of thickish round leaves. I was curious to eat some of the plant which for centuries had been credited with great virtues and found it a most palatable salad, in texture crisp and somewhat fleshy, in flavor like horse-radish. Near by

[1] Fernald & Wiegand, Rhodora, xii. 226 (1910)

was an attractive and strange grass which proves to be *Hordeum boreale* Scribner & Smith, a species heretofore known only from Alaska to northern California. But it was growing late and I had so often been tardy at Mr. Grant's table that I hastened back this last day to leave if possible a better impression of my punctuality and appreciation and found a Labradorian meal which would please the most epicurean palate,— a choice of young puffins or young divers, with greens of *Atriplex patula*, var. *hastata*.

Although the boreal plants above enumerated and many others not here mentioned are the species which at first attract the New England botanist visiting the Straits of Belle Isle, they are after all surpassed in geographic interest by a large number of species which one might be tempted to ignore. Mingled with the northern species on the terrace-slopes are the following and many more which to the New Englander make a very tame list: *Phegopteris Dryopteris* and *polypodioides*, *Botrychium virginianum*, *Equisetum scirpoides*, *Milium effusum*, *Cinna latifolia*, *Carex Deweyana*, *vaginata*, *laxiflora*, var. *leptonervia*, and *capillaris*, var. *elongata*, *Clintonia borealis*, *Streptopus amplexifolius*, *Microstylis monophyllos*, *Ranunculus abortivus*, *Actaea rubra*, *Mitella nuda*, *Ribes triste*, *Geum macrophyllum*, *Viola Selkirkii*, *Viola renifolia*, *Conioselinum chinense*, *Chiogenes hispidula*, *Galium triflorum*, *Linnaea borealis*, var. *americana*, *Solidago macrophylla*, and *Petasites palmata*. If one were to enumerate the more typical woodland plants of northern New England and eastern Canada I am quite sure that all of these would be in the list. And it is for just this reason that their occurrence on the terraces and tablelands north of the Straits of Belle Isle is of greatest interest.

In such accounts as I have found (except possibly Cartier's) the coasts of the Straits of Belle Isle are described as desolate and bare, and even Cartier, in 1534, entering the Straits and anchoring at Blanc Sablon, was so impressed with the barrenness that he wrote: "If the land was as good as the harbors there are, it would be an advantage; but it should not be named the New Land [1] but [a land of] [2] stones and rocks frightful and ill shaped, for in all the said north coast I did not see a cart-load of earth, though I landed in many places. Except at Blanc Sablon [3] there is nothing but moss and small stunted woods;

[1] Cartier had just come up the east coast of Newfoundland and apparently took southern Labrador to be part of the same region.

[2] Bracketed phrase inserted by the translator.

[3] At Blanc Sablon the shores and flat country back of the shores are covered with drifting sand.

in short, I deem rather than otherwise, that it is the land that God gave to Cain;"[1] and again on his second voyage, in 1535, he wrote: "The whole of the said coast from the Castles as far as here[2] bears east-northeast and west-southwest, ranged with numerous islands and lands all hacked and stony, without any soil or woods, save in some valleys."[3] And at the present time the people at Blanc Sablon insist that there has never been any forest there and that no timber exists within four or five miles of the Straits. Yet, the first day I saw upon the terraces east of Blanc Sablon such plants as have just been enumerated I was convinced that a forest must have been there, since these are so distinctly woodland species and so decidedly not plants typical of the Arctic barrens and tundra. So my delight can be imagined when, crossing with Kidder the tableland east of Blanc Sablon, we came upon buried logs in the bog and soon after found numerous stumps protruding from the moss. Some of the stumps (plate 86, fig. 2), now much crumbled, were still a foot or more in diameter and indicated an ancient forest of considerable size. Just when this forest lived it is difficult to say, but if it still throve in the 16th century Cartier did not give a very clear indication of it. Only by such indefinite expressions as "except at Blanc Sablon there is nothing but moss and small stunted woods" and "without any soil or woods, save in some valleys" did he indicate a possible forest covering. But here at least was a remnant of the forest which had once sheltered *Carex Deweyana*, *Actaea rubra* and *Viola Selkirkii*, though at the present time only shrubs or dwarf straggling trees, as described by Cartier, thrive on the bleak and wind-swept shores of the Straits of Belle Isle; and that the forest was an extensive one and presumably once fringed the entire length of the Straits we are safe in assuming from the presence at Bonne Espérance, L'Anse au Clair, Forteau, Red Bay, and Chateau (as shown by the collections of John A. Allen and others) of a relict forest vegetation (sometimes further augmented by *Onoclea sensibilis*, *Osmorhiza obtusa*, *Pyrola secunda*, etc.) such as abounds on the terraces of Blanc Sablon.

The "Home" which we had expected back from Battle Harbor Saturday night came Sunday evening and we found ourselves sharing a stateroom with two professors from the Methodist College at

[1] J. P. Baxter, Memoir of Jacques Cartier, 86 (1906).
[2] From Chateau Bay as far as Brest, west of Blanc Sablon.
[3] J. P. Baxter, l. c. 130.

St. John's, who were making a circuit of Newfoundland collecting plants for their newly organized Natural History Society. As loyal British subjects they were trying to identify their plants by means of Bentham's *Handbook of the British Flora;* and I am sure they were able thus to identify nearly half the species they found, for of the known vascular plants of Newfoundland (scarcely 1000 species) more than 400 occur in Scotland, northern England or Ireland, though about 825 of them are found in the "manual region."

At Port Saunders we were joined again by Wiegand and Kittredge who, having met at Forteau with no such comfortable quarters as we enjoyed at Blanc Sablon, had come south a week before and had been having a busy week on the limestone barrens about Ingornachoix Bay and on Pointe Riche. They had some of the best things of Blanc Sablon — *Hordeum boreale* Scribner & Smith, *Kobresia caricina* Willd., *Juncus triglumis* L., etc. — and a most interesting lot besides: *Carex bicolor* All., quite like the smallest European specimens; *Salix reticulata* L., reported years ago from Ingornachoix Bay by la Pylaie and so far as we can make out just like the shrub of northern Europe; other strange willows including a beautifully distinct species allied to the Lapland *S. lanata* L.; *Lesquerella arctica* (Richardson) Watson, var. *Purshii* Watson, a single stunted individual but precious, for the plant had heretofore been known only from Anticosti; *Drosera anglica*, familiar in the marl-bogs of Gaspé; *Potentilla maculata* Pour., now extended south from northern Labrador; *P. nivea* L., an arctic species already familiar to me on calareous cliffs of eastern Quebec, but here with remarkable old thickened caudices; *Dryas integrifolia* Vahl, another arctic type familiar on the Gaspé limestones; *Campanula rotundifolia* L., var. *alaskana* Gray, a gigantic variety previously known only from the Bering Sea region; two new *Antennarias*, one of them a canescent variety of *A. alpina* (L.) R. Br. (var. *cana* Fernald & Wiegand [1]), the other apparently an undescribed species; *Tanacetum huronense* in a dense low and very pubescent form found in dry exposed shingle; and other good things too numerous to mention.

Once back to our presses at Birchy Cove it took us only two days to put up all our specimens and by means of corrugated boards and hot papers [2] to get them ready to leave, so that in three days we were

[1] Rhodora, xiii. 24 (1911).

[2] See J. F. Collins, Rhodora, xii. 221 (1910).

established for a short time at the comfortable and to us quite luxurious "Log Cabin" at Stephenville Crossing at the head of Bay St. George. Kidder after the Labrador trip had returned to Boston for a happy errand — his marriage, and we naturally missed his hearty comradeship and the jingle in his rück-sack of arrow- and spear-heads as they clicked against the bones of ancient Esquimaux, Montagnais, or Beothuks.

The "Log Cabin" at Stephenville Crossing, more elegantly known as St. George's Hotel, is situated at the edge of extensive sand dunes where were *Ammophila arenaria, Carex silicea* and *C. hormathodes*, var. *invisa*, just as if we were on the coast of Cape Cod or Long Island. This region had been so thoroughly worked over by Messrs. Eames and Godfrey that there was little of novelty for us, but we were specially interested to find upon the sands or clays and the bogs just the plants which had been seen on the similar Carboniferous area of central Newfoundland, and a few others which were now beginning to mature: *Lycopodium inundatum, L. complanatum*, var. *flabelliforme, Spartina glabra*, var. *alterniflora, Scirpus subterminalis, Habenaria blephariglottis, Calopogon pulchellus, Hypericum virginicum, Cicuta bulbifera, Gaylussacia dumosa*, var. *Bigeloviana* Fernald,[1] and *G. baccata*, which are all typical species of our sterile New England coast. Around some of the sand-bottomed pools were dense carpets of *Juncus pelocarpus*, identical with the plant of our sandy shores, and, contrasting with it, the creeping or floating *J. subtilis*. All summer we had been forced by the abundance of the attractive but taxonomically most perplexing Eye Brights to collect many different lots of *Euphrasia*. But here were two or three which we had nowhere seen before, so that much of our time was taken in collecting and studying them.

Then on Monday, August 8, we drove out the north shore of Bay St. George to the village of Port à Port. Here the Carboniferous sandstones gave way to Silurian limestones and the locality which first attracted our attention and took practically all the time we had was the southwestern edge of Table Mountain (in Newfoundland almost every community on the west coast has its own "Table Mountain"), a white limestone tableland rising only about 1000 feet (300 meters) above Port à Port Bay. When we reached the crest we were

[1] Rhodora, xiii. 99 (1911).

puzzled to know where to begin, for we had only the one day for exploring this vast area, with bare unforested alpine barrens stretching some miles to the east and farther to the north, while beyond we could see the higher bare-topped tablelands of the Lewis Hills, serpentine, diorite, limestone, and trap, which at their highest points attain an altitude of 2700 feet (800 meters). There was no time to lose, for everywhere about us were most of the species we had first met and had then considered to be rarities on the Marble Mountain, Cow Head, Ingornachoix Bay, or the terraces of Blanc Sablon and Forteau. The western margin of the tableland is mostly dry and shingly (plate 87, fig. 4), but farther back becomes boggy, with small pools and wet runs. On the drier portions of the first low dome of the mountain which we explored the commonest species were *Salix vestita* which is apparently common on all the limestones of western Newfoundland; *Lesquerella arctica*, var. *Purshii*, here in great profusion; *Tofieldia palustris*; a number of strange Euphrasias; *Carex pedata* Wahlenb., a tiny species heretofore unknown south of Greenland and arctic Alaska; *Carex rupestris* All., probably commoner than is supposed, for it abounds on dry limestones of Gaspé as well; *Dryas integrifolia* and a variety with the leaves white-pubescent above (var. *canescens* Simons, previously known only from Ellesmere Land); *Antennaria alpina*, var. *cana*; and the more generally distributed Saxifrages and Arenarias, *Anemone parviflora*, *Thalictrum alpinum*, etc. The wetter part of this dome was quite boggy, and in the humus and moss we found a few of the ordinary bog plants, which did not venture upon the open limestone gravel.

The drier surface of the second dome visited lacked the *Lesquerella*, *Carex pedata*, and several other plants which had abounded on the farther side of a narrow wooded sag, but here was a strange *Antennaria* in great profusion — the remarkable plant subsequently described as *A. eucosma*,[1] and as yet known only from this mountain and Anticosti Island, and here were many other plants we had not seen on the first dome: *Woodsia glabella* in the full glare of the alpine light (I had never before seen it except in humus at the crests of woodland cliffs); *Hedysarum alpinum*, *Oxytropis campestris*, var. *caerulea*, *Potentilla fruticosa*, var. *tenuifolia* Lehm. forming little prostrate mats upon the rock; and other plants as yet not worked out. In a

[1] Fernald & Wiegand, Rhodora, xiii. 23 (1911).

wet boggy run upon this dome, where we flushed a covey of ptarmigan which started one by one almost from under our feet, were *Kobresia caricina*, *Juncus triglumis*, *Equisetum variegatum*, and other species which we had only occasionally met; but the greatest discovery here was a finely fruited *Carex* which we at once recognized as the long-lost *Carex Hornschuchiana* of Newfoundland. In 1794 Goodenough, in describing from Eaton his *C. fulva*, supplemented the description of the English plant with the comment: "I have received it from *America* and *Newfoundland*, but never understood till very lately that it was an inhabitant of our country."[1] Goodenough's Eaton plant subsequently proved to be a hybrid of one of the forms of *C. flava* and the common European *C. Hornschuchiana* Hoppe, so that the name *C. fulva* is correctly applied only to the hybrid, and the identity of the Newfoundland plant mentioned by Goodenough has remained somewhat vague. The plant of Table Mountain (and also of Hugh's Brook, Bay of Islands, where we subsequently found it) is quite like typical *C. Hornschuchiana* except in size of the perigynia and other minor characters[2] and singularly enough was associated with forms of *C. flava* and a hybrid so like the true *C. fulva* of Goodenough as to differ only in the slightly larger perigynia. The rediscovery of this Newfoundland plant was indeed gratifying, but in view of the occurrence on the limestones of western Newfoundland of a few other plants — *Gentiana nesophila*, *Lesquerella arctica*, var. *Purshii* and *Antennaria eucosma* — which are otherwise known only

[1] Good. Trans. Linn. Soc. ii. 178 (1794).

[2] Carex Hornschuchiana Hoppe, var. **laurentiana** Fernald & Wiegand, n. var., a forma typica recedit habitu majore, foliis basilariis 3–4 mm. latis, culmis 3–6 dm. altis, spicis foemineis crassioris, perigyniis 3.5–4.5 mm. longis.

Differing from the typical form of the species in its larger habit; the basal leaves 3–4 mm. broad; the culms 3–6 dm. high (in the European 3–4.5 dm. high); the pistillate spikes thicker; perigynia 3.5–4.5 mm. long (in the European 3 mm. long).— Newfoundland: wet runs and boggy spots in limestone barrens, altitude 200–300 m., Table Mountain, Port à Port Bay, Aug. 16, 1910, *Fernald & Wiegand*, no. 2897 (type-specimen in Gray Herb.); marsh near the mouth of Hugh's Brook, Bay of Islands, September 6, 1910, *Fernald & Wiegand*, no. 2898. Quebec: peat marsh or bog, Ellis Bay, Anticosti, September 7, 1883, *J. Macoun*, no. 32.

It is possible that var. *laurentiana* will prove to be identical with *Carex Greeniana* Dewey, Am. Jour. Sci. xxx. 61 (1836). The latter plant was "found in the neighborhood of Boston, by B. D. Green[e]; described from specimens in Dr. Torrey's herbarium," and by subsequent authors was said to be *C. fulva*. The specimen preserved in B. D. Greene's own herbarium (at the Boston Society of Natural History) is immature and does not show clearly whether or not the plant is typical *C. Hornschuchiana* or var. *laurentiana*. Nothing of the sort has subsequently been found near Boston and there is a possibility, as has more than once been suggested, that the Greene specimens were a casual introduction from Europe.

on the limestone island of Anticosti,[1] it is interesting to find that the same large-fruited American variety of *Carex Hornschuchiana* was collected in 1883 on Anticosti by Professor John Macoun and was listed in his Catalogue as *C. fulva*, "certainly indigenous."

The discovery of this plant would have made a fitting climax for one of the most thrilling days of our summer, but after we had repeatedly made solemn vows to look at nothing else and were finally hastening back across the barren in order to reach the settlement before dark, an unusual appearing *Senecio* came riding down a mass of sliding gravel to my very feet. This was too great a temptation, so I snatched the plant as it was sliding past and Professor Greenman tells me that it is one of a unique group of species supposed to grow only on the highest of the Rocky Mountains. While hurrying in the twilight down the slope to Port à Port we found damp ledges covered with *Phegopteris Robertiana*, a species rare in America, but quickly distinguished in the field from the common *P. Dryopteris* by its narrower firmer fronds and gray-green color. We were very late to supper but Mrs. MacDonald had a tempting rabbit stew and fresh lettuce ready for us; and next morning, after a breakfast of *Lactarius deliciosus* (which we had never before made a *pièce de résistance*), when we washed and sorted our plants we found that we had collected on Table Mountain 184 species in quantities varying from one to twenty sheets — one of our record days for the summer.

On the way back to Birchy Cove Wiegand and I left the train half way up Harry's River and followed the valley all day from there to the Log Cabin at Spruce Brook, on St. George's Pond. The region traversed was one we had watched with interest from the train, for there in the limy alluvium the plants reached a wonderful degree of luxuriance. The goldenrods, all strange to us and still unidentified except *Solidago rugosa*, var. *villosa*, were shoulder high; *Calamagrostis Pickeringii*, one of the commonest grasses of the island and elsewhere rarely 3 dm. high, was here more than 1 meter tall; *Deschampsia caespitosa*, which elsewhere on the island, as in eastern Canada and New England, is commonly 3 to 6 dm. high, here attained a gigantic stature, the first clump which met our gaze as we descended from the train being 1.5 meters (5 feet) high with panicles nearly 5 dm. long; and in walking through the Ostrich Ferns and Cow Pars-

[1] Certain badly crumbled specimens from Labrador seem to be *Lesquerella arctica*, var. *Purshii*, but better material is needed to confirm its occurrence on that coast.

nips on the river flats we felt like mere pygmies with the latter plants stretching high above our heads. Surely if farming is ever to succeed in Newfoundland, where people have lived for three centuries without seriously attempting it, this is the region which should take the lead — a valley with deep limestone alluvium, with a native vegetation similar to that of "the Aroostook, the Garden of Maine," lying in nearly the same latitude and shut in by hills sufficiently high to afford considerable protection from the bleaker winds. Messrs. Dodd and Paulett, the energetic proprietors of the ill-fated Log Cabin at Spruce Brook (burned during the winter of 1909–10, then rebuilt and burned again last summer) have already demonstrated that this soil will yield wonderful crops, and of all the regions seen by us it seemed the one best worth developing. Many plants common to this region and northern Maine were seen, *Cypripedium hirsutum, Eupatorium purpureum*, var. *foliosum, Cystopteris bulbifera, Trisetum melicoides*; and commonest of all *Carices* in the valley, *Carex flava*, var. *gaspensis* Fernald, first found in the Gaspé Peninsula but later in the rich valley of the Meduxnakeag in Aroostook County.[1] On the gravelly beach of St. George's Pond, as well as along Harry's River, the handsome *Epilobium latifolium* L., was abundant, and at several points we saw the Foxglove, *Digitalis purpurea*, which had spread from the wild garden at Spruce Brook and, Mr. Paulett informed us, has now established itself for five miles around, as it did long ago on the northwestern coast of America.

Leaving the new collections with Kittredge to care for Wiegand and I went back to the Blomidon tablelands (plate 87, fig. 3). The first day and a half were devoted to the serpentine area, where we followed up many strange plants which still await critical study. *Juniperus communis*, var. *montana*, common everywhere on the island, was now in fully mature fruit and conspicuous for the large size of the berries. *Drosera linearis* was abundant about some of the shallow pools; and we were suddenly struck with the fact that the only fern on the serpentine besides the everywhere abundant *Adiantum pedatum*, var. *aleuticum* was *Osmunda regalis*, a species we had observed hardly anywhere else on the island, though others have found it in the more sterile sections. But here the plants were anything but regal, 1.5 to 3 dm. high, with the very short oblong pinnules

[1] See Rhodora, xii. 115 (1910).

quite different in their proportions from those of the ordinary plant. A study of the serpentine plant shows it to be *O. regalis*, var. *pumila* described by Milde and taken up by Luerssen as a constant variation known only from Brandenburg and Silesia.

Foot-travel in Newfoundland, except on the beaten trails and open tablelands, is notoriously difficult, and the Blomidon talus-slopes are no exception. At the end of the first day Wiegand had succeeded in bruising one of his feet so that next morning I started, accompanied only by our packer, a particularly foul-smelling "Jacky Tar" as the French of this coast are called, for the diorite tableland which lay a few miles to the west of our camp. It was necessary practically to climb the slope of the intermediate serpentine tableland, then to descend 1500 feet to the bed of Blomidon Brook and up the other side which was diorite. The freshly broken talus was slightly calcareous and had some of the common calciphiles, but the weathered rock from which the soluble lime had leached was carpeted in patches with the plants we are used to on our granitic mountains, and *Phyllodoce caerulea* was here seen for the first time in the entire summer and *Stipa canadensis* was apparently new to the island. Here were no signs of the plants of the serpentine which abounded only a short distance to the east, and much of the tableland was wooded and covered with a dense carpet of moss and humus. Ponds and shallow pools were everywhere and I was glad to find in one of them *Callitriche anceps* Fernald[1] which was discovered in 1906 in ponds on Tabletop Mountain, Gaspé, and which we had found also in Blanc Sablon River. *Drosera anglica* was common as were many plants which earlier in the summer had been quite new to us; but the species which interested me most were two which seemed entirely out of place in this subalpine habitat. Among the tufts of *Scirpus caespitosus* which, as on many similar barrens, formed broad carpets in the drier portions of the bogs, was the famous little fern of the New Jersey Pine Barrens, *Schizaea pusilla*, already known in Newfoundland from collections of la Pylaie, Waghorne, and Eames & Godfrey and after we had once seen it found wherever we looked for it; also known at remote stations in Nova Scotia, but quite unknown between there and southern New Jersey. Here at 2000 feet altitude it abounded over many acres, nestling in the bases of the *Scirpus* tussocks; while in many

[1] Rhodora, x. 51 (1908).

of the shallow ponds *Potamogeton Oakesianus*, another New Jersey species and one of the commonest of its genus on Nantucket and Cape Cod, though unknown in eastern Maine, New Brunswick and Nova Scotia, was fruiting profusely.

Long before dark I had followed Wiegand's unfortunate example of the day before and came into camp hobbling on one foot and a heel. He, fortunately, was on both feet again, but when we got back to Birchy Cove and the doctor found that I had cracked the tendon of my little toe I was laid aside for repairs and it was nearly two weeks before I ventured off the piazza. Wiegand and Kittredge meanwhile went on the "Home" to Bonne Bay, by many said to be the most picturesque fiord south of northern Labrador. This trip had been one of my fondest hopes, for the mountains about Bonne Bay are a duplication of those about the Bay of Islands and years ago, when I first read Logan's account of Bonne Bay, I had set my heart on sometime making a comparison of that region and the Bay of Islands area. But, although it was necessary to delegate to others this part of the work, my enforced housing brought the great pleasure of at last making the acquaintance of the paleontologist, Professor Charles Schuchert who, with his companion (making up the "Yale Expedition" of the Newfoundland papers) had been studying all summer much the same region as the "Harvard Expedition," but whom we had always preceded or immediately followed at our various centers of work.

In less than a week Kittredge returned bringing part of the Bonne Bay collections, but the "hoodoo" was still with us. Kittredge was yellow with jaundice and soon returned to Boston and a less strenuous life. Wiegand, after leaving Bonne Bay, had gone north to Blanc Sablon whence he returned without mishap bringing the remainder of the Bonne Bay collections. These, in brief, were an exact duplication of the Blomidon plants, the Bonne Bay serpentines yielding the *Adiantum, Osmunda, Danthonia, Lychnis, Arenaria arctica* and *A. ciliata*, var. *humifusa, Statice*, and all the others (except perhaps *Festuca scabrella* which it was now too late to collect); Lookout Mountain, the Bonne Bay counterpart of the diorite portion of the Blomidon Range yielding *Schizaea pusilla, Potamogeton Oakesianus* and two plants we had not before seen: *Sparganium hyperboreum*, found by Eames and Godfrey on the Blomidon diorite; and *Eleocharis nitida*, a little sedge heretofore known only from the diorite region at the head of the Ottawa River in Canada.

Thus I have recounted some of our discoveries and have as briefly as possible, though I fear at too great length, tried to give some impression of our more notable days of field-work during the past summer. Many unchronicled days yielded important results and after determining all the plants we can by matching in the herbarium and by the ordinary works of reference we have a stack of "snags" in many tight bundles awaiting monographic study. And if I have laid no stress on the abundance of insect pests which Newfoundland shares with Gaspé, Anticosti, Labrador and New Jersey, it is because we soon grew accustomed to our veils and canopies and took them as mere incidents in a thoroughly absorbing summer.

Part II. The Geographic Origin of the Flora of Newfoundland.

There are many comparisons which it would be interesting to make: of the flora of the west coast, for example, with that of the east as shown by the collections of Waghorne, Robinson and Schrenk, Howe and Lang, Sornborger, and others, but we still know too little of the detailed distribution to undertake such generalizations with assurance. Certain facts of wider scope, however, are so obvious as to challenge immediate explanation. As we have seen, the boreal and even the arctic floras are abundantly represented in Newfoundland; and, especially in the sandy areas or in the bogs on the Carboniferous sandstones the plants of southern New England, Long Island, New Jersey, and even of the more southern Coastal Plain are abundant,— such species as *Panicum implicatum, Ammophila arenaria* (found also on the sand dunes west of Blanc Sablon), *Scirpus subterminalis, Carex silicea, C. hormathodes, C. sterilis* (*atlantica*), *C. trisperma*, var. *Billingsii, Eriocaulon septangulare, Juncus pelocarpus, Habenaria blephariglottis, Spergularia rubra, Arenaria peploides*, var. *robusta*,[1] *Pyrus arbutifolia*, var. *atropurpurea, Corema Conradii, Elatine americana, Hudsonia ericoides, Myriophyllum tenellum, Vaccinium macrocarpon, Gaylussacia dumosa*, var. *Bigeloviana, Utricularia clandestina, Solidago uniligulata, Aster radula* and *A. nemoralis;* while there and even on the highest mountain-tablelands *Schizaea pusilla, Potamogeton Oakesi-*

[1] See Rhodora, xi. 114 (1909).

anus, and *Rynchospora fusca* of our southern coasts are mingled with arctic-alpine species. These two elements, the arctic-alpine and the southern coastal types are, then, abundant; but when we look for the commonest plants which abound in all the forested area west of Newfoundland, from eastern Quebec, New Brunswick, and Nova Scotia to the Great Lakes, i. e. the typical Canadian species, we find them singularly few in number.

These facts become more vivid when we map the known distribution in eastern America of the species which make up the native flora of Newfoundland. So far as we yet know, the indigenous species and recognized varieties on the island number 783, while there are about 200 species clearly introduced by man. The indigenous plants when traced throughout their known continental ranges fall into four primary classes distinguished from their geographic position (in relation to Newfoundland) as:

Class I. Boreal Types.

Class II. Western or Canadian Types not included in I.

Class III. Southwestern Types.

Class IV. Endemic Plants or Species unknown on the American Continent.

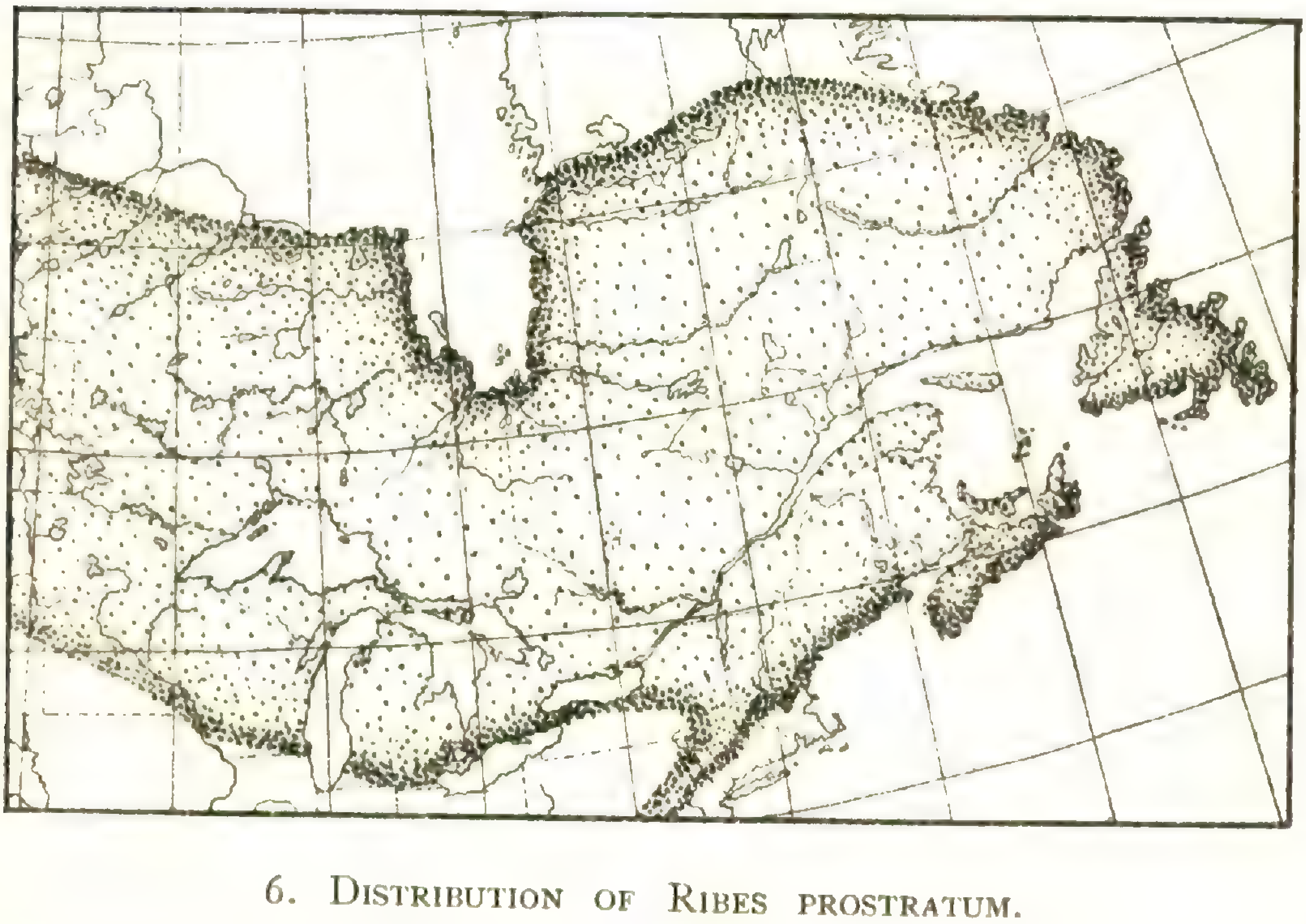
These major floras may be further defined and subdivided as follows:

CLASS I. BOREAL TYPES. Here are included all species which occur to the north of Newfoundland: in Labrador proper, Baffin Land, Ellesmere Land or Greenland or in the arctic-alpine regions farther west. In their detailed distribution these plants fall into four subclasses which together include **466 species = $59\frac{2}{5}$ per cent** of the Newfoundland flora.

SUBCLASS A. ARCTIC-ALPINE SPECIES COMMON TO NEWFOUNDLAND, LABRADOR, AND EASTERN CANADA (the Gaspé Peninsula or the more exposed portions of New Brunswick and Nova Scotia). **216 species = $27\frac{3}{5}$ per cent** of the Newfoundland flora.

This large group includes such familiar plants of our higher Canadian or New England mountains as *Lycopodium Selago*, *Phleum alpinum*, *Calamagrostis hyperborea*, *Poa alpina*, *Scirpus caespitosus*, *Carex rariflora*, *Juncus trifidus*, *Tofieldia palustris*, *Salix Uva-ursi*, *Betula glandulosa*, *Arenaria arctica*, *Lychnis alpina*, *Thalictrum alpinum*, *Dryas integrifolia*, *Empetrum nigrum*, *Rhododendron lapponicum*, *Phyllodoce caerulea*, *Arctostaphylos alpina*, *Diapensia lapponica*, and *Pinguicula vulgaris;* and their range in America is fairly typified by the Mountain Cranberry (*Vaccinium Vitis-Idaea*, var. *minus*) which is common from

5. Distribution of Vaccinium Vitis-Idaea, var. minus.



6. Distribution of Ribes prostratum.

Newfoundland and the North Shore of the St. Lawrence northward, but south of the lower St. Lawrence is restricted to the more exposed mountains, high hills, rock-coasts and cold bogs. The range of this plant in eastern America is shown in plate 88, fig. 5.[1]

SUBCLASS B. ARCTIC-ALPINE SPECIES COMMON TO NEWFOUNDLAND AND LABRADOR (OR GREENLAND) BUT UNKNOWN IN EASTERN CANADA OR NEW ENGLAND. **16 species = 2 per cent** of the Newfoundland flora.

This subclass includes widely distributed polar species all of which are likely to be found on Anticosti or the Gaspé Peninsula: such plants as *Hordeum boreale, Kobresia caricina, Carex pedata, Juncus triglumis, Capsella elliptica* C. A. Meyer, *Cochlearia anglica, Potentilla maculata,* and *Antennaria alpina*, var. *cana*.

SUBCLASS C. ARCTIC-ALPINE SPECIES KNOWN IN VARIOUS SECTIONS OF NORTHERN CANADA OR ALASKA BUT AS YET UNKNOWN IN LABRADOR PROPER. **16 species = 2 per cent** of the Newfoundland flora.

These are mostly plants confined to the highly magnesian rocks (serpentine, etc.), areas which because of their extreme sterility are rarely visited by those who are looking for plants. The magnesian areas of Labrador, when explored, will doubtless yield these plants: such species and varieties as *Adiantum pedatum*, var. *aleuticum, Danthonia intermedia* and *Festuca scabrella*.

SUBCLASS D. HUDSONIAN OR CANADIAN PLANTS COMMON TO NEWFOUNDLAND, SOUTHERN OR FORESTED LABRADOR, AND EASTERN CANADA. **218 species = 27⅘ per cent** of the Newfoundland flora.

It is naturally difficult to draw a definite line between the Arctic-alpine and the Hudsonian plants on the one hand and the Hudsonian and Canadian on the other, for in such regions as Newfoundland and eastern Canada these groups mingle in the most perplexing fashion. The plants of Subclass D are probably chiefly Hudsonian for they extend across the Labrador Peninsula to the Atlantic coast or the Straits of Belle Isle, but this subclass contains a number of species, already enumerated on p. 125, which are ordinarily of more southern range and belong more properly to the Canadian or even the Alleghanian flora. **The significant point for the present study is the fact that these 218 plants of Subclass D occur north of Newfoundland, in Labrador.** This large group includes, besides the species listed on p. 125, such very familiar species as *Cryptagramma Stelleri, Dryopteris Filix-mas, Lycopodium complanatum* (true), *Larix laricina, Picea canadensis, P.*

[1] The maps here reproduced show the broad range of the species but do not attempt to indicate exact stations.

mariana, Abies balsamea, Triglochin palustris, Scirpus hudsonianus, S. atrocinctus, Eriophorum gracile, Carex Michauxiana. Habenaria hyperborea, H. dilatata, H. obtusata, Spiranthes Romanzoffiana, Listera cordata, Salix balsamifera, S. candida, Populus balsamifera, Betula pumila, Drosera rotundifolia, Parnassia parviflora, Ribes lacustre, R. prostratum, R. triste, Pyrus sitchensis, Amelanchier oligocarpa, Geum macrophyllum, Epilobium angustifolium, Circaea alpina, Osmorhiza obtusa, Heracleum lanatum, Cornus canadensis, Pyrola minor, Primula farinosa, var. *macropoda, Halenia deflexa, Galium labradoricum, Viburnum pauciflorum* and *Solidago macrophylla.* A good conception of the broad range of this group is gained from the map (plate 88, fig. 6) showing the distribution in eastern America of the Skunk Currant (*Ribes prostratum*).

CLASS II. WESTERN OR CANADIAN TYPES NOT REACHING LABRADOR. **27 species = 3½ per cent** of the Newfoundland Flora.

These plants occur on the west side of the Gulf of St. Lawrence (in northern Nova Scotia, New Brunswick, the Gaspé Peninsula and adjacent area or on Anticosti) but are unknown in central and southern Nova Scotia, coastal Massachusetts, Long Island and eastern and southern New Jersey. From the following list, which includes all of the species of Class II, it will be seen that many of these plants are such as by further exploration are likely to be discovered in Labrador, when they will take their places in Class I; and that none of them are characteristic (if found at all) in the southern half of Nova Scotia and the coastal region southward.[1] *Potamogeton filiformis, Trisetum meliciodes, Eleocharis nitida,*[2] *Scirpus pauciflorus, Carex eburnea, Carex flava,* var. *gaspensis, C. Hornschuchiana,* var. *laurentiana,*[3] *Carex castanea, Juncus compressus* Jacq., *Juncus alpinus,* var. *insignis, Tofieldia glutinosa, Zigadenus chloranthus, Listera auriculata, L. convallarioides, Salix glaucophylla, S. Barclayi, Polygonum Roberti* Loisel.,[4] *Ranunculus Macounii, Ribes hirtellum,* var. *saxosum,*[5] *Viola nephrophylla, Shepherdia canadensis, Pyrola asarifolia,* var. *incarnata, Gentiana nesophila, Galium kamtschaticum, Lobelia Kalmii, Antennaria eucosma,*[6] and *Tanacetum huronense.*

CLASS III. SOUTHWESTERN TYPES. This class contains **274 species = 35 per cent** of the Newfoundland flora. It consists of

[1] For notes on *Lesquerella arctica,* var. *Purshii* see p. .

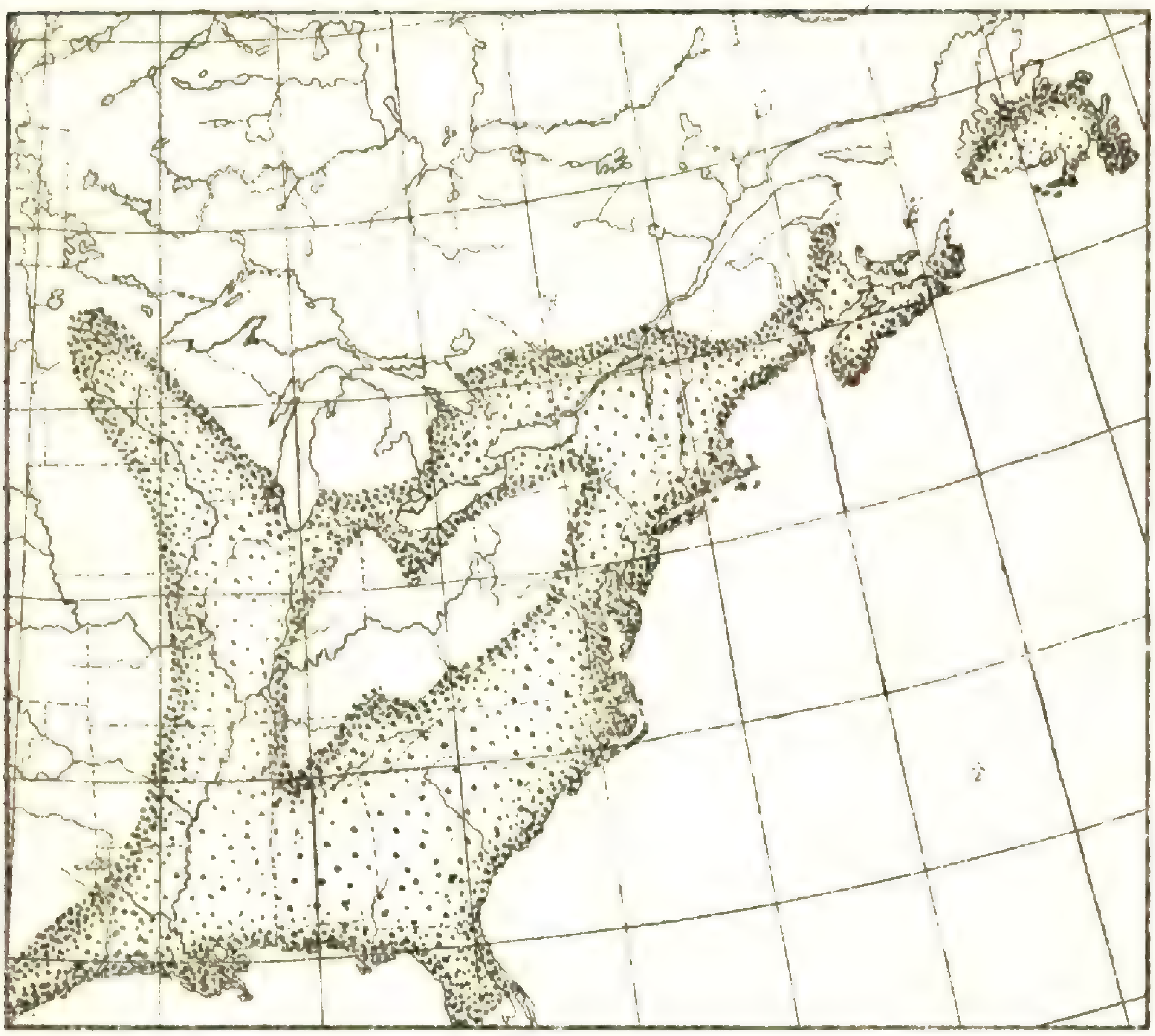
[2] Known as yet only from western Newfoundland and the upper Ottawa River (see p. 134).

[3] There is a possibility that this was once found in eastern Massachusetts (see p. 130).

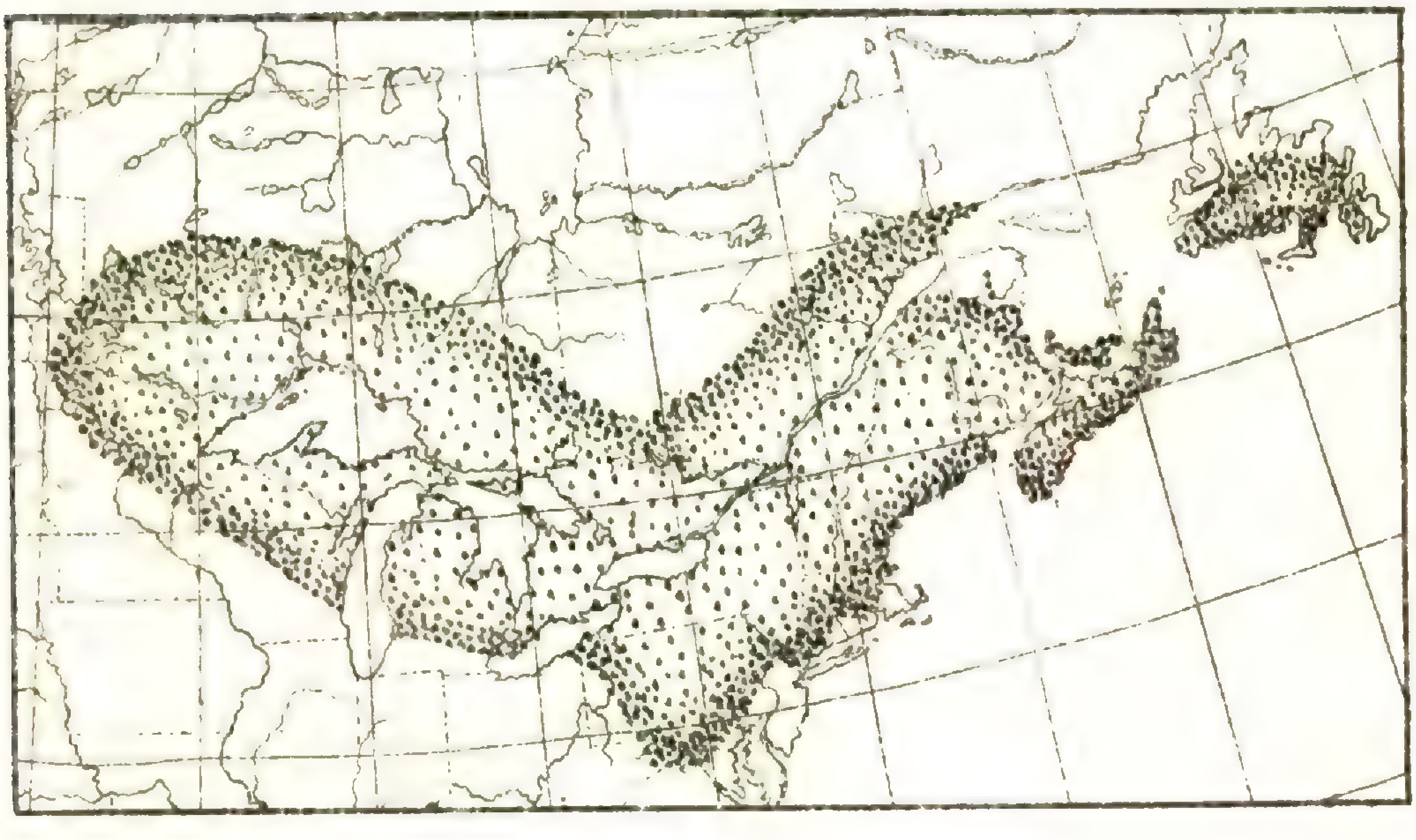
[4] *Polygonum Roberti* has been collected at the Grand Narrows, Cape Breton (*Macoun*, no. 20,206).

[5] See Rhodora, xiii. 75, 76 (1911).

[6] See Rhodora, xiii. 23 (1911).



7. Distribution of Calopogon pulchellus.



8. Distribution of Pinus resinosa.

plants found chiefly in regions to the southwest of Newfoundland and may be divided into two subclasses.

Subclass A. Canadian and Alleghanian Plants common to Newfoundland, Nova Scotia, New Brunswick, and coastwise New England but unknown in easternmost Quebec or Labrador. **214 species = 27⅓ per cent** of the Newfoundland flora.

It is not possible in our northeastern regions to distinguish sharply between the Canadian and Alleghanian floras. Many plants such as *Onoclea sensibilis, Osmunda cinnamomea, Pinus Strobus, Cypripedium acaule, Salix humilis, Spiraea latifolia, Acer rubrum, Aralia hispida, Pyrola americana, Epigaea repens, Lysimachia terrestris*, and *Solidago rugosa* abound in both regions and very often encroach upon the Carolinian area. In placing species in Subclass A no distinction has been made between Canadian and Alleghanian; **but the significant point in regard to this large group is that its species occur in the North Atlantic States, Nova Scotia, and often New Brunswick, are rare or unknown on the Gaspé Peninsula or Anticosti, and reach their northeastern limit on the continent in western Saguenay County, Quebec, 400–500 miles west of the Straits of Belle Isle**.

Besides the species just enumerated this group contains such very familiar plants as *Dryopteris cristata, Lycopodium complanatum*, var. *flabelliforme, Pinus resinosa, Panicum boreale, Oryzopsis asperifolia, Glyceria canadensis, Elymus virginicus, Scirpus georgianus, Rynchospora fusca, Carex vulpinoidea, Juncus effusus*, var. *Pylaei*,[1] *J. canadensis, Trillium cernuum, Calopogon pulchellus, Pogonia ophioglossoides, Arethusa bulbosa, Salix discolor, Polygonum sagittatum, Pyrus melanocarpa, Rosa virginiana, Ilex verticillata, Oenothera pumila, Cicuta bulbifera, Gaultheria procumbens, Gaylussacia baccata, Vaccinium macrocarpon, Apocynum androsaemifolium, Lycopus uniflorus, Viburnum cassinoides, Lobelia Dortmanna, Eupatorium purpureum*, var. *maculatum, Aster nemoralis, A. umbellatus*, and *Antennaria neodioica*. As good representatives as any of the distribution of Subclass A are the familiar bog orchid, *Calopogon pulchellus*, the range of which is shown in plate 89, fig. 7, and the Red or Norway Pine, *Pinus resinosa*, the range shown in plate 89, fig. 8.

Subclass B. Carolinian Plants common to Newfoundland, Nova Scotia, Cape Cod and adjacent islands, Long Island, or coastal and southern New Jersey, but rare or unknown inland or in continental eastern Canada. **60 species = 7⅔ per cent** of the Newfoundland flora.

[1] See Rhodora, xii. 92 (1910).

The plants of Subclass B are more restricted in their distribution than the more southerly elements of Subclass A, being confined to the silicious and boggy coastal strip represented by the New Jersey Pine Barrens, southern and eastern Long Island, Cape Cod and adjacent coasts, sandy portions of Nova Scotia, Sable Island, and silicious and other sterile areas of Newfoundland, only in the most exceptional cases found far inland or northward in New England or eastern Canada. Several of these plants are enumerated on p. 135, among the most notable of them being *Schizaea pusilla, Potamogeton Oakesianus, Ammophila arenaria, Carex hormathodes, C. silicea, C. sterilis, Juncus effusus*, var. *conglomeratus* Engelm. (known in America only from eastern Newfoundland, southeastern Connecticut, and the Pine Barrens of New Jersey), *Spergularia rubra, Arenaria peploides*, var. *robusta, Corema Conradii, Elatine americana, Hudsonia ericoides, Myriophyllum tenellum, Gaylussacia dumosa*, var. *Bigeloviana*, and *Utricularia clandestina*. The distribution of this group is represented on plate 90, showing the ranges of *Schizaea pusilla* (fig. 9) and of *Corema Conradii* (fig. 10).

CLASS IV. ENDEMIC PLANTS OR SPECIES UNKNOWN ON THE AMERICAN CONTINENT. A small class, **16 plants = 2 per cent** of the Newfoundland flora, divided into

Subclass A. Endemic Plants. **8 plants = 1 per cent** of the Newfoundland flora, chiefly varieties of continental types.

Subclass B. Old World Types as yet unknown on the American Continent. **8 species = 1 per cent** of the Newfoundland flora.

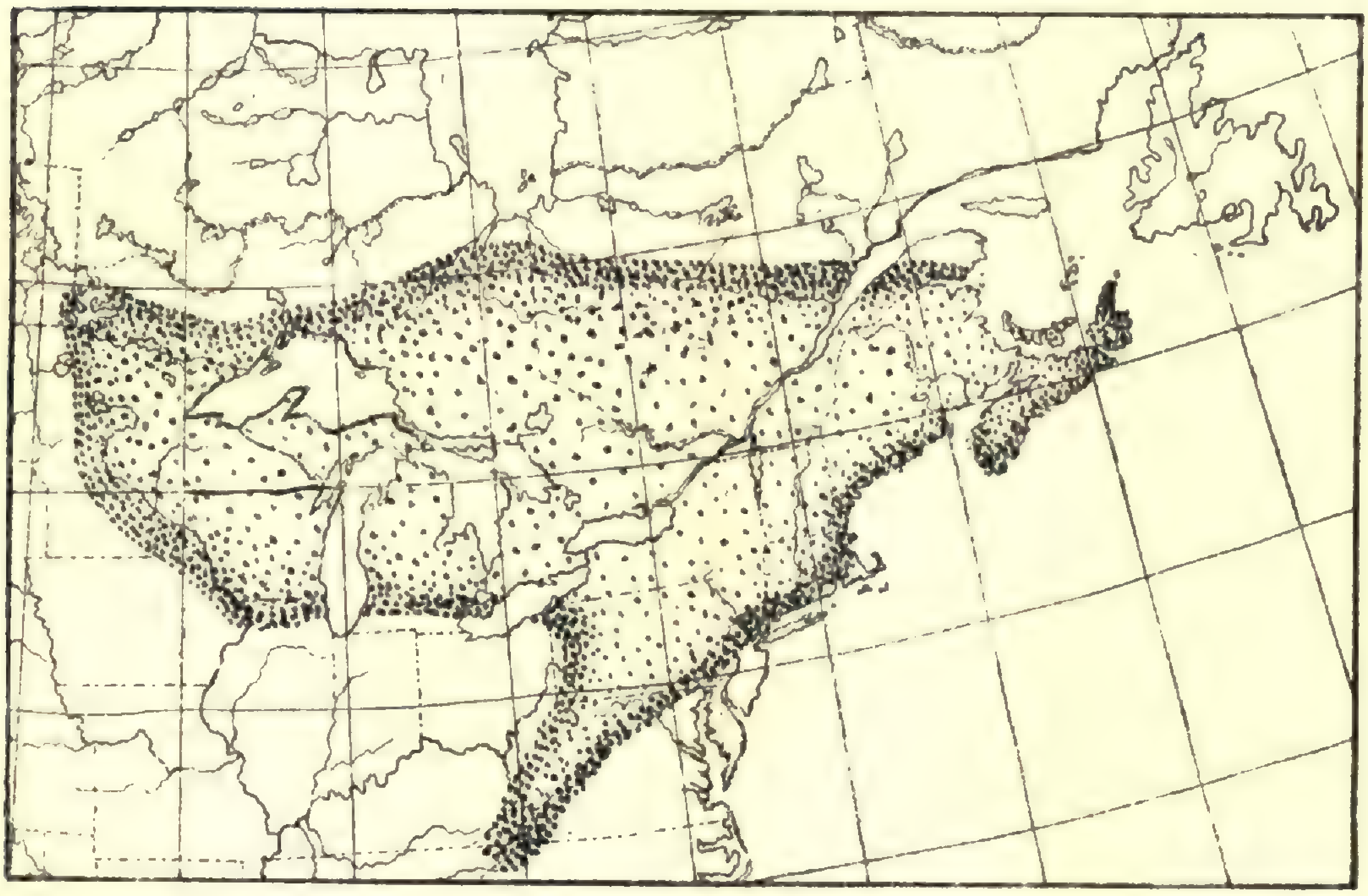
These plants, such species as *Montia rivularis* Gmel., *Saxifraga Geum* L., etc., are mostly either technical or obscure boreal species which are likely to be found in Labrador or are known from Greenland.

Briefly summarized, the analysis of the indigenous flora is

Class	No. of Plants	Per cent of Indigenous Flora
Class I. Boreal Types	466	59½
Class II. Western or Canadian Types not reaching Labrador	27	3½
Class III. Southwestern Types	274	35
Class IV. Endemic Plants or Species Unknown on the Continent	16	2
	783	100

9. Distribution of Schizaea pusilla.

10. Distribution of Corema Conradii.



11. Distribution of Aster macrophyllus.

The striking feature of this analysis is of course, as already stated, the fact that of the indigenous plants of Newfoundland 94½ per cent are identical either with species found to the north of the Straits of Belle Isle or with plants which occur along the Atlantic seaboard to the southwest; while only 3½ per cent are most typically Canadian plants which on the continent find their greatest development in latitudes and climatic zones parallel with those of central and southern Newfoundland. As previously suggested a very large proportion (340 + species) of the plants which abound on the continent at the western edge of the Gulf of St. Lawrence and which we should expect to find in appropriate habitats in Newfoundland seem to be quite absent from the island. I have spoken (p.115) of the absence from the calcareous valleys of Arbor Vitae and some of its regular associates. Besides these we have searched for in vain and others have failed to find in Newfoundland such very familiar species as *Adiantum pedatum*,[1] *Dryopteris marginalis, Sagittaria latifolia, S. arifolia, Alisma Plantago-aquatica, Poa Sandbergi* Vasey (one of the most abundant grasses on calcareous rocks of the Gaspé Peninsula), *Eleocharis obtusa, Carex stricta, C. lurida, C. retrorsa, Arisaema triphyllum, Veratrum viride, Lilium canadense, Trillium erectum, T. undulatum, Populus grandidentata, Ostrya virginica, Quercus rubra, Polygonum cilinode, Anemone riparia, A. canadensis, Clematis virginiana, Corydalis sempervirens Penthorum sedoides, Tiarella cordifolia, Chrysosplenium americanum, Dryas Drummondii* Richardson (which, in the Silurian regions of Anticosti and the Gaspé Peninsula, covers the river-gravels), *Prunus pumila, Dalibarda repens, Acer Saccharum, Viola septentrionalis, Pyrola asarifolia*,[2] *Steironema ciliatum, Mimulus ringens, Lonicera canadensis, Sambucus canadensis, Viburnum alnifolium, Eupatorium urticaefolium, Solidago squarrosa, Aster macrophyllus, A. acuminatus, Erigeron philadelphicus, Bidens cernua,* and *Prenanthes altissima*; these, as just said, only a few of the most conspicuous of 340 + such

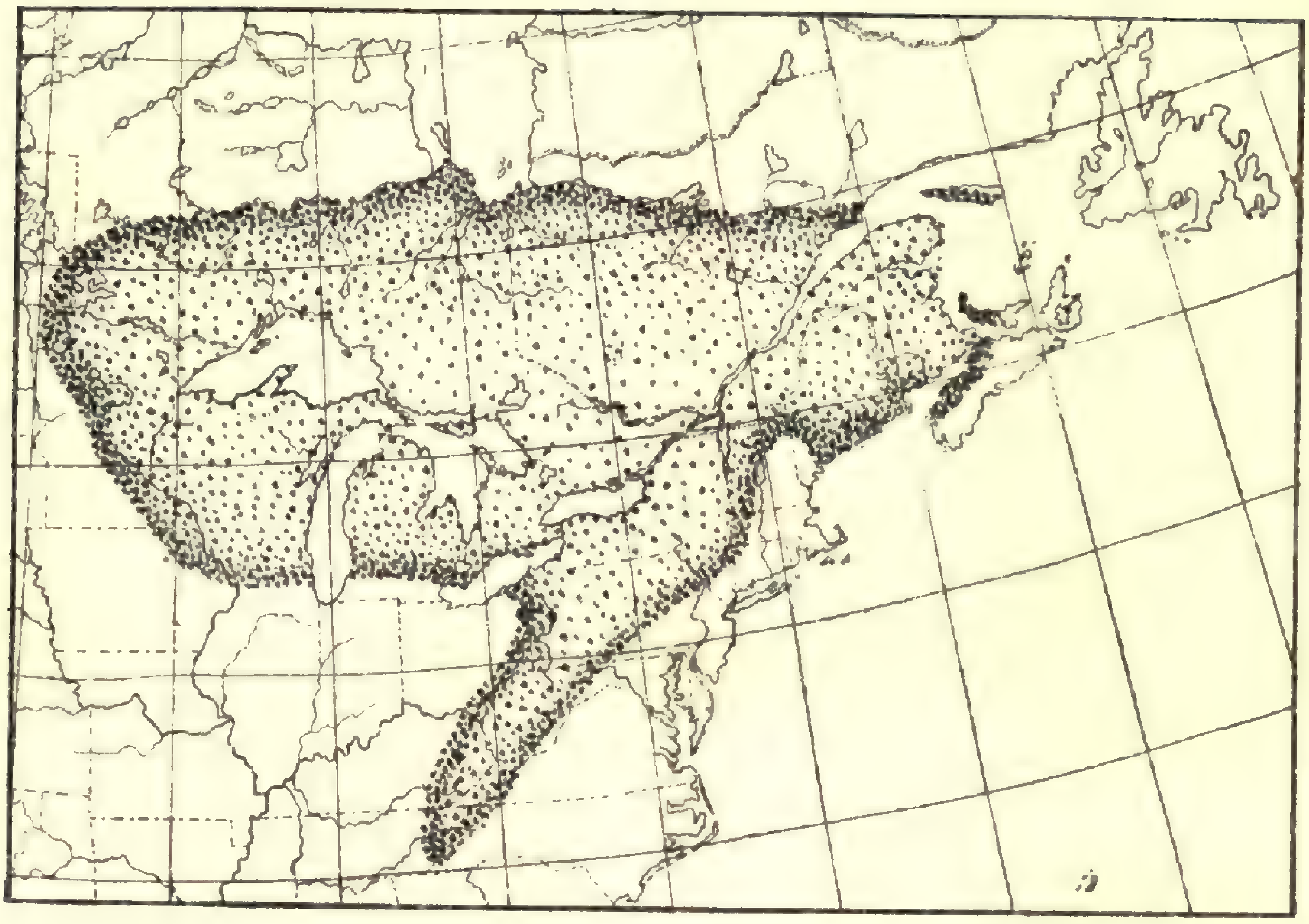
[1] La Pylaie naïvely states that the mountains north of Hare Bay have been named *Montagne du Capillaire*, because of the abundance there of *Adiantum pedatum* (Voyage, 3); but in Newfoundland the name *Capillare* is so generally used for *Chiogenes*, from the berries of which a highly esteemed preserve is made, that it is probable that this fruit was more concerned than *Adiantum* with the naming of the mountains. The only *Adiantum* known in Newfoundland is *A. pedatum*, var. *aleuticum* which is common on the serpentine barrens.

[2] *P. asarifolia*, var. *incarnata* which is a more northerly plant than typical *P. asarifolia* occurs in western Newfoundland.

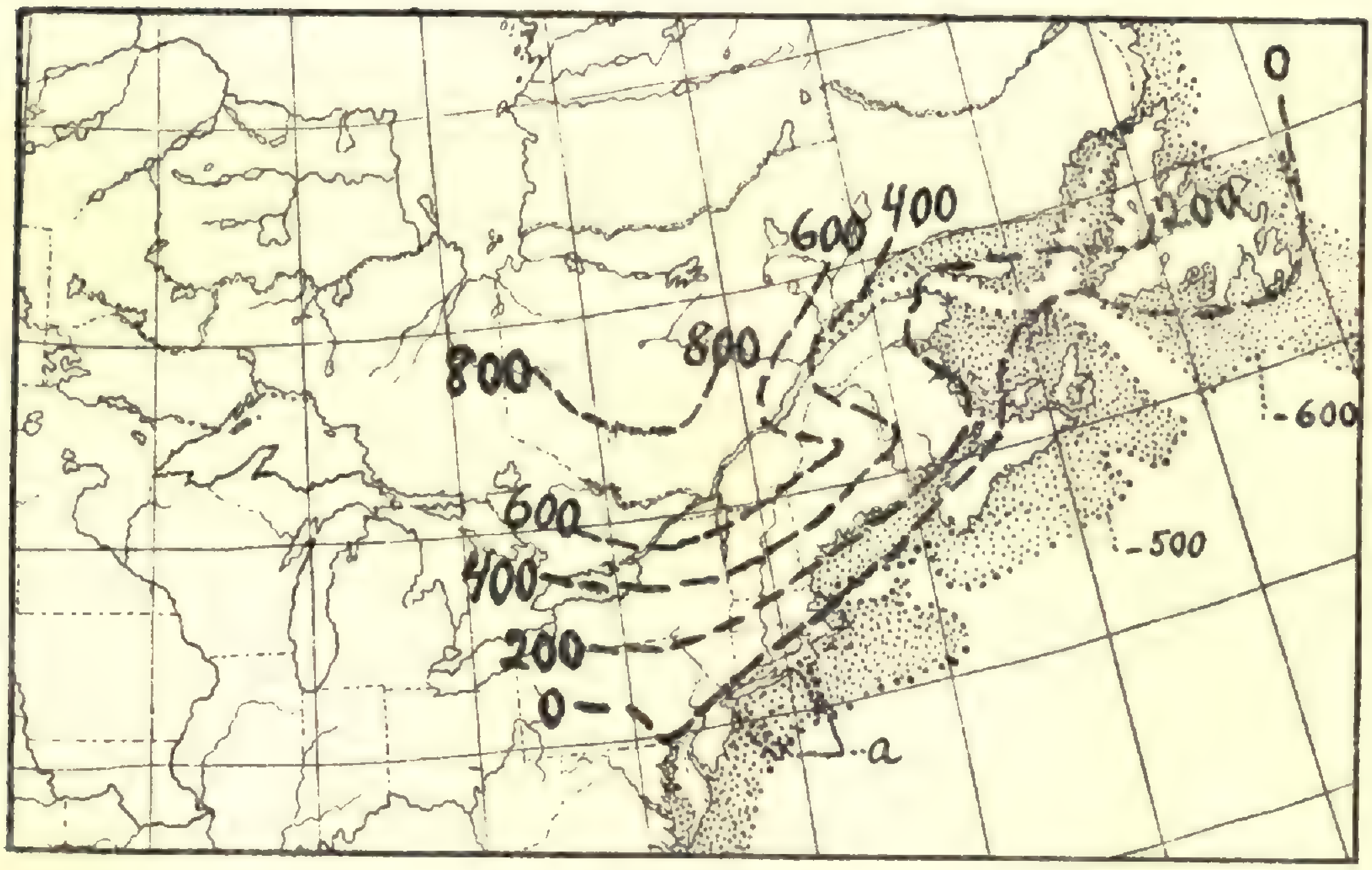
species, a large flora which on the continent occupies a fairly definite and broad belt between the Hudsonian element of Class I and the group of species embraced in Class III. Typical ranges of these Canadian plants are shown in plates 90 and 91, indicating the distribution of *Aster macrophyllus* (fig. 11), perhaps the most common Aster of the eastern Canadian forests, and of the Arbor Vitae, *Thuja occidentalis* (fig. 12), one of the most abundant and valuable trees of eastern Canada.

Here indeed is an anomalous situation. Although from the insular position of Newfoundland we should naturally expect that her flora would lack many species, it is certainly by more than a mere coincidence that the island lacks a large proportion of the most typical plants which on the mainland to the west abound in similar latitudes and under essentially identical conditions of climate and soil, but at the same time possesses so large a proportion of the Arctic-alpine flora mingled, often in closest proximity, with plants characteristic of southern New England, and even of the Cretaceous and Tertiary clays and sands of the New Jersey Pine Barrens. The presence on the island of the 466 Boreal plants of Class I (59½ per cent of the whole flora) is apparently simple to explain, for the northern peninsula of Newfoundland is separated from the Labrador Peninsula merely by the Straits of Belle Isle which are in many places only 11 or 12 miles across. The endemic plants and those not known upon the continent of North America (Class IV) may also be passed for the present since, when that country is better known, the latter will presumably be found in Labrador, and since the endemic plants are without exception minor variants or immediate relatives of continental types, showing that the flora of the island is of comparatively recent origin; in this resembling the flora of the Faeröes, a region which, as Warming states, forms "a strong contrast to other Atlantic islands, viz. the Azores, Madeira, and the Canaries, which are rich in endemic species, and have a flora which is very old, related to that of the Tertiary time; this can only be accounted for by the fact that no Glacial Period destroyed the old plant-world of these islands."[1] The greatest problem, and the only one with which we will at present deal, concerns Classes II and III, the typical Canadian flora which is very meagrely represented in Newfoundland, and the somewhat

[1] Warming: The History of the Flora of the Faeröes. Botany of the Faeröes, ii. 662 (1903).



12. Distribution of Thuja occidentalis.



13. Copy of a portion of de Geer's Map of the last Change of Level in Eastern North America. Broken lines are Isobases with 200 foot interval. Dotted portion, the submerged Coastal Plain. a. Submarine River-channels.

more Southwestern plants which together with the Boreal make up $94\frac{1}{2}$ per cent of the flora of the island; a flora which, it is almost needless to say, must have reached Newfoundland since the receding toward the north of the Pleistocene glaciers.

Besides by human transportation there are five methods by which plants are commonly supposed to have reached islands: by transportation by birds, by ocean-currents, by floating ice and logs, by winds, or by having crossed on a formerly existing land-bridge. All of these methods may well have been effective in bringing to Newfoundland the plants of Group I, the Boreal types, but before accepting them as the sources of the floras of Groups II and III, the typical Canadian and the Southwestern plants, we may well consider them in some detail.

Birds. There has long been a strong tendency, based in part on the notes of Darwin and others, to believe that many difficult problems of plant distribution are to be explained by assuming that the seeds or fragments of the plants have been transported by birds. But it can only be said that the best evidence is opposed to this explanation of the origin of the floras of the more remote islands of the North Atlantic. In their exhaustive treatises on the sources of the Faeröese flora Warming and Ostenfeld, though diametrically opposed in their final opinions (the latter urging the necessity of a post-glacial land-bridge from Scotland to the Faeröes, the former maintaining that no such bridge is demanded), both affirm that the number of plants carried by birds over such distances are almost negligible. This conclusion is based upon the studies of two eminent Danish ornithologists and is so applicable to the present problem that I quote freely from both Ostenfeld and Warming. The former says:

"As I also [formerly] laid some stress on the migrations of birds (all the more, perhaps, because I held the other disseminating agencies to be of little value) I applied to an eminent Danish ornithologist, Mr. Knud Andersen, who has made a special study of the birds of the Faeröes,[1] and he very kindly gave me the information I wanted. .... If we consider how the migrating birds would carry the seeds with them, it can only be in one of two different ways, either in the alimentary canals or adhering to their beaks, feet or feathers. With

[1] Knud Andersen: Meddelelser om Faerøernes Fugle med saerligt Hensyn til Nolsø, I and II. (Vidensk. Medd. f. d. naturh. Forening i Kjøbenhavn 1898, p. 315, 1899, p. 239).

regard to this Mr. Andersen says that in Denmark during a period of 4–5 years the intestines of all the birds found at the lighthouses were examined with the result that all without exception were empty, i. e. *the birds migrate on an empty stomach.* Even if a bird had taken food just before it left the nearest land, Shetland, it would not retain it until it reached the Faeröes, as it takes at most a few hours to digest the food and the useless parts are doubtless ejected during flight. With regard to the seeds adhering to the birds, Mr. Andersen says that here also we must bear in mind that we are speaking of migrating birds, for while a bird shot in the fields may have clumps of earth, etc. (possibly with seeds) adhering to it, this has never been found to be the case with migratory birds on the move, and he again refers to the quantity of birds from lighthouses which he has had for investigation to support him in stating with some certainty that *migratory birds are almost always clean when they journey.*"

"Thus we see that an ornithologist is of opinion that *migratory birds are of hardly any importance as disseminators of plants.*" [1]

Warming, referring to Andersen's conclusions, supplements them with the conclusions of the Danish zoologist, Winge:

"For a number of consecutive years thousands of birds, picked up dead at the Danish lighthouses, have been sent to the Zoological Museum in Copenhagen, and notes on these dead birds have for many years been published annually by H. Winge in 'Videnskabelige Meddelelser fra Naturhist. Forening.' This eminent zoologist writes to me, in a letter dated March 27, 1903, as follows:— 'In one of the first years, the contents of the stomachs were systematically examined, later on only occasionally, but the stomach has always proved to be empty, only rarely some very slight traces of food have been found, viz. small pieces of the testa of seeds, etc. (besides, in some cases, a little sand or small stones, etc.). Though I have had thousands of dead migratory birds between my hands, and have made a habit of examining every single one, I have not as yet found any seeds adhering to the feathers, beaks, or feet. Small crusts or lumps of dried mud or clay occur fairly often on the beaks and feet of birds such as wading-birds, larks, starlings, etc.; whether these crusts or lumps contain microscopical germs, has not yet been ascertained (they may undoubtedly do so), but seeds, such as may be discerned by the naked eye or with a pocket-lens, have not been found.'"

[1] Ostenfeld, Botany of the Faeröes, i. 116, 117 (1901).

"As the above observations are made by so careful and eminent an investigator, I must consequently believe that birds at least very seldom carry seeds and other larger reproductive organs, and small plants, across great distances, and the indisputable evidences of birds carrying seeds either in them or adhering to them mentioned in books evidently apply to birds shot at or not far from, their daily haunts, and not to such as have just made a long journey. Winge also has observed a great many instances of birds carrying seeds across short distances."[1]

In view of the well known character of the work of Andersen and of Winge and the fact that it is confidently relied upon by so distinguished an advocate of the land-bridge theory as Ostenfeld and by the illustrious opponent of that theory, Warming, we can do no better than to acquiesce in their conclusion, that some method other than transportation by birds is required to account for the vascular flora of the Faeröes; and to conclude that in the case of the Newfoundland vascular plants (or at least of most of them) we must also seek a better explanation.

Ocean Currents. The most pronounced of the ocean-currents which skirt the eastern coast of North America are of course the Gulf Stream which as it drifts eastward off the coast of eastern New England, Nova Scotia and Newfoundland is far out to sea, and the Labrador Current which, coming from the North, is the shoreward current along the outer coast of Newfoundland, Nova Scotia and eastern New England. That the plants of New Jersey, coastwise New England and southern Nova Scotia could not reach Newfoundland by means of the south-flowing shoreward Labrador current needs no argument; and that the Gulf Stream, far offshore and washing no part of our coast north of the West Indies would be ineffective is perfectly obvious. Nor is Cabot Strait, the water separating Newfoundland from Cape Breton, adapted to transport seeds from the latter to the former region for, as shown by W. B. Dawson, the strong trend of the currents on the western or Nova Scotia side of this Strait is from the Gulf of St. Lawrence out to the open Atlantic; but on the eastern or Newfoundland side from the Atlantic into the Gulf.[1] And the very meagre representation in Newfoundland of the characteristic Canadian plants (27 species out of more than 367) which

Warming, Botany of the Faeröes, ii. 676, 677 (1903).

abound on the west side of the Gulf of St. Lawrence shows clearly how ineffective have been the waters of the Gulf in transporting plants from Anticosti, the Gaspé Peninsula, New Brunswick and Cape Breton to the Newfoundland shores. Even the current of the gigantic lower St. Lawrence River has been surprisingly ineffective in this transportation, for not only do the 340 typical Canadian plants which are unknown in Newfoundland nearly all occur along the lower St. Lawrence whence, theoretically, their seeds, fruits or other fragments might be washed to the Newfoundland side of the Gulf; but of the 274 species which comprise our Class III, the Southwestern plants, not any of those which grow along the upper St. Lawrence but are unknown in easternmost Quebec show, so far as indicated by my daily recorded observations for many summers on the lower St. Lawrence, any evidence of extending their ranges from their continuous areas of distribution to points farther down the river. Many other plants, furthermore, such as *Dryopteris cristata, Pinus resinosa, Carex vulpinoidea, Juncus tenuis, Salix humilis, Spiraea latifolia, Rosa virginiana, Ilex verticillata, Hypericum boreale, H. virginicum, Aralia hispida, Sium cicutaefolium, Cornus circinata, Pyrola americana, Scutellaria galericulata, Chelone glabra, Viburnum cassinoides*, and *Solidago rugosa*, while extending in a comparatively solid phalanx across New England and southern Quebec as far east as Temiscouata, Rimouski or western Matane County, where the St. Lawrence has become sea-like and decidedly saline, have failed to find successful anchorage farther down the St. Lawrence, along the north shore of the Gaspé Peninsula or on Anticosti Island, although many of them extend northward along the coast from eastern New Brunswick to the north shore of the Baie des Chaleurs. This fact is further emphasized by an examination of Dr. Schmitt's catalogue of the vascular plants of Anticosti,[3] which enumerates a large number of species but, with the possible exception of *Diervilla Lonicera*, not one of them such as seem to have been stranded on the island from areas far up the St. Lawrence.[1] It is thus apparent that, although our small rivers are

[1] See A. T. Drummond: Currents and Temperatures in the Gulf of St. Lawrence. Can. Rec. Sci., vii. 54 (1896).

[2] Schmitt, Monographie de l'ile d'Anticosti, 159–234 (1904).

[3] Schmitt's *Ranunculus Harveyi, Thalictrum divicum* [*dioicum*], *T. purpurascens*, and *Viola rostrata* are unquestionably listed though errors of determination, since these are all plants of far more southern or inland areas. His *Ranunculus Harveyi* (real *R. Harveyi* is confined to Missouri and Arkansas) is possibly *R. Allenii* Robinson; his

often highly efficient in transporting and distributing plants or their fragments or fruits, the broad lower St. Lawrence, like a great drifting sea, accomplishes little toward populating the shores near its mouth with the plants from farther up-stream; and in this service not only the current of the St. Lawrence but the currents in the Gulf have been conspicuously ineffective in carrying to Newfoundland the plants which abound on the continent.

Floating Ice and Logs. These may well be efficient in bringing boreal plants upon the coast of Newfoundland, but for the reasons explained in the consideration of ocean-currents they apparently have carried few if any southwestern types to the island.

Winds. Warming feels that in case of the Faeröes winds are sufficient to have carried upon those islands most of the plants they have received from Scotland, but Ostenfeld urges that many species have seeds too heavy for ready transportation by this means. In the case of Newfoundland it is perfectly reasonable to suppose that the plants of Class I, the Boreal Species, which, as we have seen, might readily be brought from the Labrador side of the Straits of Belle Isle by birds, ocean-currents or floating ice and logs, could as readily have been transported by the winds; for the distance is so slight that the light seed (or spores) — of *Botrychium Lunaria*, *Lycopodium Selago*, *Eriophorum Chamissonis*, *Salix*, *Populus balsamifera*, etc.— might readily be wafted across, and the dried fragments or heavier fruits of other plants blown across on the comparatively short ice-bridge formed in severe winters. But the distance across Cabot Strait, the shortest route from the southwestern mainland to Newfoundland is fully 70 miles, and, although this does not seem a forbidding gap, the fact remains that very many common Canadian species with fine spores or with the seeds plumose, feathery or otherwise adapted for wind-transportation have failed to cross from Cape Breton to southwestern Newfoundland. Among such plants perfectly adapted, it would seem, for wind-transportation, at least in heavy gales or in winter when advantage can be taken of broad fields of ice, are *Lycopodium sabinaefolium*, *Adiantum pedatum*, *Dryopteris marginalis*, *Pyrola elliptica* and *Chimaphila umbellata*, with very minute spores

Thalictrum dioicum probably *T. confine* which is a characteristic plant about the Gulf of St. Lawrence; his *T. purpurascens* (a species unknown as far east as New England) is undoubtedly the common *T. polygamum* which he does not list; and his *Viola rostrata* (a woodland species very rare east of the Connecticut valley) is more likely *V. labradorica*, *arenaria*, or *adunca*, all of which occur about the Gulf of St. Lawrence.

or seeds; and *Populus grandidentata, Clematis virginiana, Acer Saccharum, Epilobium molle, Apocynum cannabinum, Asclepias Syriaca, Eupatorium perfoliatum, E. urticaefolium, Solidago squarrosa, S. latifolia, S. juncea, Aster macrophyllus, A. cordifolius, A. acuminatus, Erigeron philadelphicus, Gnaphalium polycephalum* and *Prenanthes altissima* with feathery pappus or other means of buoyancy. And even though the buoyant-seeded plants of Nova Scotia have, since the receding of the Pleistocene ice, failed to reach by means of the winds the opposite side of Cabot Strait, there are plenty of other very common plants of Cape Breton or Nova Scotia proper — such as *Leersia oryzoides, Carex lurida, C. retrorsa, Veratrum viride, Ostrya virginica, Polygonum cilinode, Osmorhiza divaricata* and *Steironema ciliatum,*— the bladdery fruits, light seeds, or dry seed-bearing fragments of which it requires no extreme stretch of the imagination to picture as blowing and bounding on the broad fields of ice finally to find lodgment on the Newfoundland shore. But theoretically simple as this process appears, such conspicuous plants of the Canadian zone seem to have failed utterly in thus crossing Cabot Strait; and if this shortest route to Newfoundland has proved too much for the Nova Scotian species it is quite obvious that the routes from Anticosti (110 miles) and the Gaspé Peninsula (more than 200 miles) are no more efficient. Otherwise we should expect to find upon Newfoundland such very common and conspicuous plants of Anticosti or Gaspé as *Anemone multifida, A. riparia, Clematis verticillaris, Arabis brachycarpa, Dryas Drummondii, Astragalus frigidus,* var. *americanus, Pyrola asarifolia, Erigeron acris,* var. *asteroides, Arnica mollis, A. chionopappa,* and *Prenanthes racemosa.*

Surely, if nearly all the plants (340 + out of 367 + species) which today abound in eastern Canada in the latitudes of Newfoundland (with the exception of the northern peninsula) but which are not characteristic of the sandy coastal country to the southwest, have thus signally failed to reach the island by means of the winds, is it not obvious that such a method for the transportation of *Schizaea pusilla,* for example, from New Jersey to Nova Scotia, thence to Newfoundland, or of the other southwestern plants which compose our Class III, is highly improbable? In fact, from the size and weight of the seeds or fruits of many of these Southwestern Types which are perfectly at home in Newfoundland — for example, *Sparganium diversifolium, Potamogeton Oakesianus, Carex folliculata, Carex in-*

tumescens, Corylus rostrata, Castalia odorata, Pyrus arbutifolia, var. *atropurpurea, Rosa virginiana, Corema Conradii, Ilex verticillata, Viola cucullata, Aralia hispida, Sanicula marilandica, Cicuta bulbifera* (reproduced by bulblets), *Cornus alternifolia, Gaylussacia baccata, G. dumosa,* var. *Bigeloviana, Vaccinium macrocarpon, Convolvulus Sepium,* and *Melampyrum lineare* — it is difficult to see how the winds could have had any efficient part in transporting them from the continent to Newfoundland.

Not only is the flora of Newfoundland composed of boreal and southwestern species with only a very meagre representation of the typical Canadian species but the fauna shows a similar composition. There are several animals, the caribou, marten, Arctic hare, ptarmigan, etc. closely akin at least to Arctic-alpine or Hudsonian species of Labrador, but the moose, porcupine, squirrels, mice, spruce partridge, and many other conspicuous animals of our Canadian forests are unknown; and Mr. Outram Bangs and Dr. Glover M. Allen inform me that the only native mouse of Newfoundland, instead of being one of the common woodland species of eastern Canada, is *Microtus terrae-novae,* the Newfoundland vole, which is closely akin to the Meadow Mice of our New England coast, and that the muskrat of Newfoundland (*Fiber zibethicus obscurus*) is very close to the muskrat (true *Fiber zibethicus*) of our continental swamps and pond shores, a species unknown from Labrador.

As we have already seen, the possibility of the southwestern coastal plants reaching Newfoundland from Nova Scotia by means of birds, ocean-currents, floating logs and ice, or by winds is very slight indeed if not entirely negligible. And surely these agencies would hardly be likely to transport to Newfoundland the vole or the muskrat, neither of which would be apt to undertake long water-journeys. We are therefore ready to consider the possibilities of the flora and at least the southern mammal-fauna of Newfoundland having reached the island by the method which we have not yet discussed, viz. by crossing on a

Post-Glacial Land Bridge. We here approach a problem upon which there is little direct geological or at least paleontological evidence, and many geological friends whom I have consulted are disinclined, from the meagreness of the geological record, to express a final opinion in the matter. But the botanical evidence, at least, is very extensive and of a rather striking nature. The isolation

at northeastern stations of Pine Barren and other Coastal Plain species is by no means confined to Newfoundland. In 1880 Professor N. L. Britton[1] called attention to the fact that many of the plants of the New Jersey Pine Barrens extend northeastward upon the Cretaceous soil (but not on the Drift) of Staten Island, and across Long Island to the similar soils of southern New England; and gradually our knowledge of these northeastern outliers of the flora of the Pine Barrens and even of more southern highly silicious areas of the Coastal Plain has increased until (omitting from consideration all plants which reach Newfoundland) we now know 118 such species which, northeast of Long Island, have remote outlying stations along the coastal strip of New England or the Maritime Provinces, and every season of botanizing is adding one or more species to the list from Prince Edward Island, eastern New Brunswick, Nova Scotia, eastern Massachusetts, Cape Cod, Marthas Vineyard, Nantucket, Rhode Island or southeastern Connecticut. A few examples will make clear this class of cases, 118 species, as already said, besides those which constitute our Class III, Subclass A of the Newfoundland flora. *Sabatia dodecandra* (*S. chloroides*), the splendid rosy pink gentian of coastal pond-shores from North Carolina to eastern Massachusetts, is quite unknown on the continent northeast of Cape Cod or north of Bristol and Plymouth Counties, Massachusetts, but on that remarkable isolated sand ridge and plain, Sable Island, 100 miles out to sea from the southeast coast of Nova Scotia, it is "the chief annual" in the flora.[2] *Aster subulatus* is a characteristic plant of coastal flats from Florida to New Hampshire, is quite unknown on the coast of Maine, southern New Brunswick or Nova Scotia, but reappears (with other southern species) in great profusion on the broad flats at the mouth of the Nepisiguit River as it enters the Baie des Chaleurs in northeastern New Brunswick. *Ilex glabra*, the Inkberry of coastal swamps from Louisiana to Florida and the Atlantic coast as far north as the region of Dorchester Bay, south of Boston, occurs 30 miles away in an isolated area of swamps in Wenham and Magnolia, its most northeasterly station in the United States, but it reappears in sandy swamps of southwestern Nova Scotia. *Magnolia virginica* of our southern Atlantic coast extends northward across New Jersey

[1] N. L. Britton: On the Northward Extension of the N. J. Pine Barren Flora on Long and Staten Islands. Bull. Torr. Bot. Cl. vii. 81–83 (1880).

[2] J. Macoun, Geol. Surv. Can. n. s. xii. 218 A (1902).

to Suffolk County, Long Island, but is unknown east of Long Island except in the famous swamp on Cape Ann (120 miles in a straight line from the nearest Long Island station) where it has been known since the days of Menasseh Cutler. *Betula nigra,* the River or Red Birch so characteristic of swamps and river-banks from Texas to Florida and throughout the lower Mississippi region, extends up our coastal plain to Suffolk County, Long Island, but, save along the lower Merrimac and adjacent regions of southern New Hampshire and northeastern Massachusetts, 115 miles from the Long Island area, is unknown in New England. *Echinodorus tenellus* is found at various stations in the Mississippi valley and about the Gulf of Mexico and the southern coast, but northeast of Canterbury, Delaware, is known only around ponds of Middlesex County, Massachusetts (a gap of 340 miles). *Scirpus Hallii,* originally described from Texas, is abundant on the shores of Winter Pond in Middlesex County, Massachusetts, but, though it is the most distinct and easily recognized species of its subgenus, it is unknown elsewhere in the Atlantic states north of Decatur County, Georgia, and Indian River, Florida, 1115 miles away. These few cases, as said, are typical of this large class of plants, for were the ranges of the remainder of the 118 species very closely scrutinized similar broad gaps in their northern distribution would be quickly apparent— such very local plants in our flora as *Lycopodium alopecuroides, Najas guadalupensis,*[1] *Panicum verrucosum, P. scoparium,*[2] *Leptochloa fascicularis, Eleocharis interstincta,*[3] *E. quadrangulata, E. Torreyana, E. tricostata,*[4] *Scirpus Longii* [5] *Rynchospora Torreyana,*[6] *Scleria reticularis, Carex ptychocarpa, C. subulata, Orontium aquaticum, Juncus brachycarpus,*[7] *J. aristulatus, Saururus cernuus, Rumex hastatulus, Sagina decumbens, Linum floridanum, Ilex opaca, Ascyrum hypericoides, Opuntia vulgaris, Cuscuta arvensis, Stachys ambigua,*[1] *Gerardia parvifolia, Viburnum venosum, Sclerolepis*

[1] See Bicknell, Bull. Torr. Bot. Cl. xxxv. 60 (1908).

[2] See Hitchcock & Chase, Cont. Nat. Herb. xv. 295 (1910).

[3] See Wiegand, Rhodora, xi. 83 (1909).

[4] See Bicknell, Bull. Torr. Bot. Cl. xxxv. 480 (1908).

[5] See Rhodora, xiii. 6 (1911).

[6] See Rhodora, x. 142 (1908); also Bicknell, Bull. Torr. Bot. Cl. xxxv. 483 (1908).

[7] See C. B. Graves, Rhodora, iv. 27 (1902); and G. G. Kennedy, ibid, 60. Dr. Kennedy's observation that at Scituate, Massachusetts, *Juncus brachycarpus* grew "in a patch of peculiar reddish soil quite different from the general soil of the ridge. The gravel was in small equal sized particles with a peculiar greasy feeling to the hand: and neither the plant nor the soil were observed elsewhere," is peculiarly interesting, since Professor Isaiah Bowman has shown (Science, n. s. xxi. 994) that at Scituate

uniflora,[2] *Eupatorium leucolepis*,[3] *Gnaphalium purpureum*, and *Coreopsis rosea*.

In 1893, Dr. Arthur Hollick, in a significant paper entitled *Plant Distribution as a Factor in the Interpretation of Geological Phenomena, with Special Reference to Long Island and Vicinity*,[4] accounted for the presence on Long Island, Martha's Vineyard, Nantucket and Cape Cod of the Pine Barren plants by demonstrating that after the receding of the Pleistocene ice there existed a land connection along the shoreward margin of the old coastal plain, which now forms the coastal bench extending gradually offshore until at a depth of about 100 fathoms — 600 feet — it abruptly meets the deeper waters of the open Atlantic. Hollick's statements bear so directly on our problem that I quote freely from them: —

"During Cretaceous and Tertiary times a series of fresh water or estuary and marine deposits (clays, sands, gravels and marls) were laid down along the eastern borders of the North American continent. About the close of the Miocene, or the beginning of the Pliocene period, an era of elevation began which finally raised them hundreds, in places thousands of feet, above their present level, forming a vast coastal plain, which extended over the entire area where we now find them, and for a considerable distance eastward, into what is now part of the bed of the Atlantic ocean. On the land side this plain was bounded by the crystalline and Triassic rocks of Connecticut, southern New York, New Jersey, Pennsylvania and southward. . . . The evidences of its extension northward around Rhode Island and Massachusetts are now almost obliterated, but there seems to be every reason to believe that its land limits were approximately the coast line of the present day. . . .Further north than Massachusetts,

are found beds of Pre-Pleistocene deposits, the uppermost being bright red sands. Dr. Kennedy's station for *Juncus brachycarpus* is at "Egypt," where there are some other Coastal Plain plants, Dr. Bowman's outcrop of Pre-Pleistocene red sands and clays at Third Cliff (about four miles south of "Egypt") where it "outcrops for a half-mile along the cliff face." It is desirable to watch at Third Cliff for the *Juncus* and other Coastal Plain species and it may be that remnants of the Coastal Plain occur nearer to Boston than at Third Cliff.

[1] See Wiegand, Rhodora, xi. 83 (1909); and Fernald, Rhodora, xii. 191 (1910).

[2] See F. T. Lewis, Rhodora, vii. 186 (1905); and J. F. Collins, Rhodora, xii. 13 (1910).

[3] *Eupatorium leucolepis* was collected at Kingston, Massachusetts, by W. P. Rich and C. H. Knowlton, August 30, 1908.

[4] Trans. N. Y. Acad. Sci. xii. 189–202 (1893).

so far as I am aware, it is not even indicated, and except for the presence of the well-recognized submerged plateau off our eastern shores all further trace of the former coastal plain is lost. Its eastern limits, where it formerly met the waters of the Atlantic ocean, were probably where we now find the borders of this plateau to be, namely, at the 100 fathom contour."

"Shortly after the advent of the Ice Age the elevation had reached its maximum. The rivers had previously cut deep valleys through the easily eroded material forming the coastal plain, in their courses to the sea, and when the continental glacier, pushing its way southward and eastward, finally flowed over the edges and escarpments of the hard crystalline rocks onto the soft and incoherent material of the coastal plain it scooped it out to a great depth in places, and then, either carrying it forward in mass, or else pushing and squeezing it ahead in a great contorted ridge, capped by the boulder till, finally left it as part of the terminal moraine. . . ."

"Just when the period of elevation ended and that of depression began, in fact, whether it was previous to, or subsequent to that of greatest ice accumulation, is yet a matter of controversy between authorities, but in either case on the retreat of the glacier, we may picture to ourselves the terminal moraine forming an elevated ridge extending through Staten Island, Long Island and the islands to the eastward, forming a continuous, more or less elevated land connection to the north and east, with what remained of the coastal plain sloping away from it on one side and a trough filled with the water from the melting glacier on the other. . . ."

"The present rate of coastal subsidence, as calculated by Prof. Geo. H. Cook, and other authorities, is about two feet per century. At this rate, six thousand years ago practically the whole of the area included within the present twenty-fathom contour would have been above sea level — only the deepest parts of the trough of the Sound being below it. . . . This area, as may readily be seen, includes the whole of Staten Island, Long Island, Block Island, Martha's Vineyard and Nantucket, besides a respectable portion of the submerged coast eastward and southward. It is also probable that at least a part of this area to the eastward, which at the present time is lower than the twenty fathom contour, has become disproportionately so in modern times by tidal scouring, and that it was actually and relatively higher formerly than now."

"Under these circumstances we should, therefore, have had, during a considerable period of time, a continuous strip of land, except for the river outlets, all the way from New Jersey to Massachusetts, separated from the mainland by a body of water occupying the trough scooped out by the glacier, which, in its present depressed and widened condition, we now call Long Island Sound, but which was then a fresh water lake or broad river. Bearing these conditions in mind we next have to consider the still further subsidence of the Champlain Period, the re-elevation of the Terrace Period, and the depression which is again going on at the present day. It is evident that at some time during these oscillations of level the sea, having eaten away the coastal plain, finally reached the barrier of the terminal moraine, where this still remained as the connecting link between Long Island and Massachusetts. The moraine gave way in places, channels were formed and detached portions remained to form the islands which we recognize today as Block Island, Martha's Vineyard, Nantucket and the host of other lesser islands which stream out from the end of Long Island towards Cape Cod and the Rhode Island shore, while the eroded portions are represented by the great submerged ridges which are known as the Nantucket and other shoals." "....it is evident that our theory implies the continued existence of land connection, between New Jersey and southeastern New England, by way of Long Island, during a sufficient period of time after the final recession of the glacier, for the pine barren flora to have spread and become established there....Long Island, Block Island, Martha's Vineyard, Nantucket, etc., as we now know them, have not been submerged since the final retreat of the glacier, and their separation into islands by the submergence of the intervening land is a comparatively modern phenomenon, due to the depression and erosion which are actively at work, and which have produced such conspicuous results during the historic period."[1]

Dana, reviewing in 1894 the botanical evidence, said: "The migration northward of the Pine Barren flora must have been during the latter part of the time of high latitude elevation. .... Each stage in the retreat was a contraction of the area of perpetual frost, and a widening of the range of tropical winds, ensuring further encroachment. In view of all the facts, it is probable that before the subsidence had

[1] Hollick, l. c. 196–201 (1893).

made large progress, the ice-sheet had retreated to Canadian territory, excepting the portions left about the higher mountains of eastern and western America."[1]

In 1908, the late John H. Sears,[2] accounting for the presence in Middlesex and Essex Counties of isolated southern plants, cited Dana's discussion of the occurrence in Northumberland Strait and at other points north of Cape Cod of a southern mullosk fauna in which Dana had concluded that, since "none of the shells are found in elevated beaches; ...the migration from south of Cape Cod took place in the Recent period. Such a migration, extending to the St. Lawrence Gulf, was not possible, unless the Labrador current had first been turned aside; and a closing of the Straits of Belle Isle would have brought this about. This implies an elevation of about 200 feet; and it may be that the rise which introduced the Recent period carried the continent, to the north, to this height above the present level. In the Champlain period of subsidence the Straits were open, this being proved by the cold-water shells of the now elevated beaches."[3] And basing his conclusions in part on the presence of the southern plants — *Echonodorus tenellus, Scirpus Hallii, Betula nigra, Magnolia virginiana,* etc., in part on the occurrence in coastal muds of Essex County of southern invertebrates, Sears concluded that the southern flora (and fauna) reached northeastern Massachusetts during the elevation which followed the Champlain subsidence.

Thus, by Hollick's interpretation, which was accepted by Dana (who placed their migration and that of the mullosks of Northumberland Straits at different times) the southern plants reached Cape Cod in "the period of Glacial emergence which made New Jersey, Staten Island, Long Island, with the islands east of it and southern New England, continuous dry land....long before the alleged subsidence had completed its work"[4]; while by Sears the time of the migration of the southern plants is placed after the Champlain subsidence. The final weighing of the more detailed geological evidence must of course be left in other hands, but it is possible that on the more general question we may gain some light by further investigating the origin of the southern flora of Newfoundland.

[1] Dana, Man. Geol. ed. 4, 980 (1894).

[2] J. H. Sears: A Southern Flora and Fauna of Post-Pleistocene Age in Essex County Massachusetts. Rhodora, x. 42–46 (1908).

[3] Dana, l. c. 995.

[4] Dana ,l. c. 995.

In the accounts above quoted of the extension to Massachusetts of the Coastal Plain plants no direct mention is made of one very important item. This is the amount of water which would necessarily have been withdrawn from the ocean in order to form the tremendous masses of ice which, as is now becoming apparent, extended simultaneously over large areas of both the northern and the southern hemispheres. Professor Reginald A. Daly, to whom I am indebted for references to papers on this subject, says: "At the time of their maximum extension the ice-sheets, which have since melted away, covered a total area which may be estimated as from five to eight millions of square miles."[1] And though there is great diversity in the estimates of the average thickness of the ice and consequently of the corresponding decrease in the depth of the ocean with the resultant lowering of sea-level all over the globe, some idea of the magnitude of this change can be gained by the following extracts from students of the subject.

Penck, in 1894, wrote: "The causes of the general rise of sea-level in the latest geological time might perhaps be connected with those climatic changes which the earth underwent in the Glacial period. If, during that time, northern Europe, northern North America, and the Antarctic regions were simultaneously glaciated, a considerable mass of water must have been removed from the ocean, and, if the thickness of ice be assumed as 1,000 meters, the sea-level must have been 150 meters below its present position."[2]

Daly, in 1910, felt that these former estimates were too great and that "the formation of the ice-sheets (which have since disappeared) would produce a negative movement of sea-level in low latitudes to an amount ranging between twenty-five and forty-five fathoms."[3]

Besides the direct removal from the ocean of water sufficient to form the ice, there is a second factor which must be taken into account. This is the gravitative power of the great masses of ice. Using the formulas of R. S. Woodward,[4] Daly calculates that "if the ice had an area of 6,000,000 square miles and an average thickness varying from

[1] Daly: Pleistocene Glaciation and the Coral Reef Problem. Am. Jour. Sci. ser. 4, xxx. 299 (1910).

[2] Penck, Morphologie der Erdoberflaeche, ii. 660 (1894) as translated by Daly, l. c. 298.

[3] Daly, l. c. 300.

[4] Woodward: On the Form and Position of the Sea Level. U. S. Geol. Surv. Bull. 48 (1888).

3,000 to 5,000 feet, the attraction of the ice would lower the level of the equatorial sea by amounts ranging from five to eight fathoms." Consequently, when the front of the northern ice-sheet extended along the coast of New England, the attraction of the ice would tend to some extent to compensate for the negative change of our sea-level produced by direct extraction of water from the ocean; but as the ice-front receded farther and farther to the north the belt of ice-attracted water would shift with it, and when New England, the Maritime Provinces, and Newfoundland were quite free from the ice-sheet and the front of the latter had receded to a point on the Labrador Peninsula, the northward moving rim of heightened water would have passed beyond us and our coast-line would feel little positive effect from this source.

If we now examine a chart showing the contours of the coastal bench which extends as a submerged fringe off the eastern coast of North America and which represents the old land-border of the continent, we shall see that in some places, for instance at Nantucket Shoals and Georges Shoal, the bench comes to within 2 or 3 fathoms of the ocean-surface, while 100 miles off Canso in eastern Nova Scotia, Sable Island rises above the water as a long sand-ridge fully 100 feet high. In many areas — the bench all the way from the coast of the South Atlantic States to Georges Bank, then Brown's Bank, then the coastal banks around western and southern Nova Scotia, Sable Island Bank, the Banquereau, St. Pierre Bank, etc.— there are portions of the old land-border forming an almost continuous chain of submerged plains which, even 100 miles out to sea, show soundings of only 25 to 44, often as low as 10 or 15, fathoms. If we trace the line of soundings which reveals the submerged coastal plain at a depth of 60 fathoms, we shall find that only the very deepest channels, such as the outlet from the deep Gulf of Maine (now 25 miles wide) between Georges Bank and Brown's Bank, or Cabot Strait between Cape Breton and the Banquereau on the west and Newfoundland and St. Pierre Bank on the east, interrupt the continuity of the coastal bench.

Now, if we concede the withdrawal of water from the ocean to form the ice of the Glacial Period and disregard for the moment the possibility of any other change in the level of the coast, it will be obvious that vast areas off our present shore must have their ocean-water withdrawn. If we take Penck's view that "the sea-level must have been 150 meters [492 feet or 82 fathoms] below its present position"

almost the entire coastal bench, cut through only by the deepest channels such as that from the Gulf of Maine and Cabot Strait, would have been dry land. But if Daly's more conservative figures ("between twenty-five and forty-five fathoms") are taken it is apparent that, although much of the coastal bench would have been dry land, there would have been innumerable shallow channels between the uncovered areas.

Furthermore, it is quite apparent that the height of the now submerged coastal bench, composed of friable deposits augmented by great masses of loose terminal moraine material, must, during and after its submergence, have been tremendously reduced not only by the denuding action of the waves but by the strong water-currents aided by the winds. We can gain some conception of this rapid reduction of the height and area of these remnants of the old coastal plain by observations made on Sable Island. In his account of Sable Island, Professor John Macoun said: "When the Admiralty survey of the island was made in 1799 it was found to be thirty-one miles long and two broad, though according to the older French charts it had been forty miles in length and two and one quarter in breadth. Lieut. Burton, who surveyed the island in 1808, found it to be thirty miles long and two wide".[1] In 1855, according to Sir William Dawson, the island was "about 23 miles in length, and from one mile to one and a half in breadth."[2] Des Barre's charts of 1779 show that some of the hills (not the highest he stated) were 146 feet above sea-level. Today the charts show an island less than 22 miles long, and according to Macoun the highest hills "are now but little over 100 feet" in height. Macoun further says in regard to Sable Island: "The popular opinion that as it wastes in one part it makes in another is fallacious. Another erroneous idea is that the wind wastes the hills and levels the land and causes destruction. The wind is a builder and the sea is the leveller. The wind certainly shifts the sand but it cuts out in one place only to build up in another. By it the sand is blown inward, but none to sea, except perhaps to a small extent during a very heavy gale. On the other hand, the currents that are set in motion by the winds, and others of a permanent character, are constantly cutting away the sand and carrying it out to sea, and if

[1] Macoun, Geol. Surv. Can., Ann. Rep. n. s. xii. 213, 214A (1902).
[2] Dawson, Acad. Geol. 380 (1855).

a high tide should throw some of this back, which it often does, the wind, by blowing this inward, at once begins to build up new hills."

It is apparent, then, that during the maximum development of the last ice-advance (the Wisconsin of glacial geologists) a very large portion of our coastal bench must have been above the sea-level of that time, forming, as it were, a broad sand-bar off the mouth of the Gulf of Maine at least to the edge of Georges Bank. Opposite this to the east would have been another continuation of the sandy belt running along the Nova Scotia coast and across Sable Island Bank and the Banquereau to Cabot Strait, with St. Pierre Bank beyond. In fact, since the ice-action was very slight about the Gulf of St. Lawrence and there is no evidence of ice-action on the Magdalen Islands, it is safe to assume that the channel from the Gulf of St. Lawrence (Cabot Strait) was not then of nearly such depth and breadth as at the present time. Then when the ice began to recede and the water from its melting (impeded in its progress seaward by various barriers) began to return to the ocean, the deeper channels would first become filled and not until the ice-front had reached a comparatively high latitude would the more elevated portions of the coastal bench become submerged.

Here, then, would be a strip of sands and similar soils stretching with only slight interruptions from our South Atlantic coast to Newfoundland, and it is probable that not far in the wake of the receding ice and the more boreal plants and animals the Coastal Plain plants with the Newfoundland vole and the muskrat crossed on this sandy bridge to Newfoundland, though some other plants and animals which farther south occur with them or to which they are closely related — *Sabatia dodecandra*, *Ilex glabra*, etc. — failed to cover the entire distance. Although many of the plants which seem thus to have reached Newfoundland belong to southern or even sub-tropical groups and on the continent find their great development from Cape Cod to Texas or even eastern Mexico, it is apparently unnecessary to assume that at the time of this migration the southeastern edge of the ice was far north of Newfoundland or even had fully receded from the island. For today, with arctic ice often fringing far into the summer the eastern and northern portions of Newfoundland, and snow and ice lying until mid-July or even through the drier summers upon the bleak slopes, *Schizaea pusilla* and *Xyris montana*, isolated representatives of large tropical families, and *Bartonia iodandra*, an essentially endemic

outlier of a southern Coastal Plain genus, fruit profusely among the tussocks of *Scirpus caespitosus* and other Arctic species on the highest alpine barrens of Newfoundland; and *Potamogeton Oakesianus* is there as thoroughly at home with *Sparganium hyperboreum* of Greenland as on Nantucket [1] with *Najas guadalupensis.*

The withdrawal from the ocean of a great body of water to form the Pleistocene glaciers and the gradual restoration of it to cause the submergence of our coastal bench give us, then, a sufficient basis upon which to build the land bridge necessary to carry the Coastal Plain plants, the muskrat and the vole to Newfoundland, and gradually to isolate them upon that island. But other factors may have had to do with the former height of the coastal bench. For instance, in his paper *On Pleistocene Changes of Level in eastern North America,* Baron Gerard de Geer [2] shows that although in the later Pleistocene submergence the ocean covered areas which now are far above sea-level (Mt. Desert Island with late Pleistocene beaches at 210 feet on the hills; St. John, New Brunswick, at about 269 feet; Dalhousie, New Brunswick, at 174 feet; Rivière du Loup at 373 feet; with points farther inland showing beaches at 600–800 feet), southeast and east of this now uplifted region there is a belt including Perth Amboy (New Jersey), Long Island, Martha's Vineyard, southeastern Massachusetts, southern, central and eastern Nova Scotia, eastern Prince Edward Island, the Magdalen Islands, and the southern margin of Newfoundland, which shows no sign of Post-Pleistocene uplift. This line (de Geer's isobase for zero) south of which no evidence has been found of recent elevation is so nearly coincident with the northern line of our supposed land-bridge that the eastern portion of de Geer's map is here reproduced (plate 91, fig. 13), with the omission of the colors and some inland features which do not bear directly on our problem. And, although inland from de Geer's isobase for zero the land has clearly been elevated since Glacial times,[3] Professor J. B. Woodworth, who has kindly helped me to several references, informs me that he knows no evidence of Post-Glacial elevation south of that isobase but that, whatever may be the changes at present going on, there are many evi-

1 "It [*Potamogeton Oakesianus*] is exceedingly abundant in some of the small ponds of Nantucket, where it fruits very freely." — Morong, Mem. Torr. Bot. Cl. iii. No. 2, 15 (1893).

2 De Geer, Proc. Bost. Soc. Nat. Hist. xxv. 454–477 (1892).

3 Recent observations have altered in some details the courses of de Geer's isobases but have not changed his zero line along the coast west of Newfoundland.

dences which demand, since the Glacial Period, a decided subsidence outside that line.

If we now examine the lists of characteristic plants of Class III, the Southwestern plants which, it seems to me, must have crossed from southern New England to Newfoundland on this bridge, we shall see that they are all species typical of our more purely silicious plains, sterile hills, or acid bogs, but not of the better mixed soils such as the glacial till; many of them being plants which in New Jersey are today abundant only on the Cretaceous and Tertiary clays, sands and gravels and which farther south are almost confined to the Coastal Plain and similar areas.[1] If, on the other hand, we examine the list of characteristic Canadian plants which, though abundant on the west side of the Gulf of St. Lawrence, are unknown in Newfoundland, we shall see that they are chiefly species of rich woods, meadows or other well mixed soils, or highly calcareous ledges and gravels.

When, therefore, we consider the fact that the bridge formed by the elevated coastal plain was composed of silicious soils presumably identical with those found upon the southern Coastal Plain of our present continent it is evident that an ideal route was laid out for the spread northeastward of the plants which prosper chiefly in such soils and it is easy to picture the Red Pine, *Pinus resinosa*, accompanied or soon followed by *Schizaea pusilla, Corema Conradii, Hudsonia ericoides*, and the other southwestern plants of highly silicious regions, pushing successfully across the bridge to Newfoundland, while *Sabatia dodecandra* got as far as Sable Island and *Ilex glabra* reached the sandy swamps of Nova Scotia. Here too, in the boggy meadows and about the shallow pools, would be a habitat over which the vole and the musk-rat would rapidly spread. But such a very silicious region would have been highly unattractive to *Adiantum pedatum, Thuja occidentalis, Carex retrorsa, Lilium canadense, Calypso bulbosa, Anemone riparia, Dalibarda repens, Lonicera canadensis, Viburnum alnifolium, Solidago squarrosa, Aster macrophyllus*, and the hundreds of other plants of richer soils, which not only in eastern Canada but farther south (when they occur there) scrupulously avoid the more sterile areas; and even if they did occasionally straggle slightly off the richer soils

[1] Compare, for example, Britton, Bull. Torr. Bot. Cl. vii. 81 (1880) and Cat. Pl. N. J. (1889); Hollick, Trans. N. Y. Acad. Sci. xii. 191, etc. (1893) and Am. Nat. xxxiii. 1–14, 109–116 (1899); R. M. Harper, Rhodora, vii. 69 (1905), viii. 27 (1906).

in which they delight, these plants would have found the long belt of pine barren region of the bridge as forbidding to them then as are such habitats today. Similarly, though the caribou, Arctic hare, ptarmigan and other boreal animals of Newfoundland, would find the bridge congenial territory, the moose, porcupine, and other mammals of the Canadian forest would find little inducement to leave the denser woods to wander far upon the sand-bridge, and for this reason apparently they failed to accompany the vole and the muskrat (as well as the caribou, etc.) to Newfoundland.

To summarize briefly, the indigenous flora of Newfoundland consists primarily of plants which occur .to the north, in Labrador, or to the southwest, chiefly along the Atlantic seaboard or the Coastal Plain; the typical Canadian plants, unless their northeastern range extends to the north side of the Straits of Belle Isle, being essentially absent from the island. The distance between Newfoundland and Labrador is not sufficiently great to prevent ready interchange of species across the Straits of Belle Isle, but the distance between Newfoundland and Cape Breton is so great that the plants of the latter region rarely if ever span it. Birds, ocean-currents, drifting logs and ice, and winds prove to be ineffective in carrying to Newfoundland the plants from the southwest, so that an ancient land-bridge is suggested. This is the more demanded from the presence in Newfoundland of a vole and a muskrat, mammals closely related to species of our coastal region. The amount of water withdrawn from the ocean to form the Pleistocene glaciers was apparently sufficient to leave exposed nearly if not all the old coastal plain which now forms the submerged bench off our coast, and in addition there is unquestioned evidence that since the Glacial Period this coastal bench has been much higher than it is now; so that upon this now submerged plain, as the ice-front receded northward, the southwestern plants, most of which still occur on Cape Cod, Long Island or in the Pine Barrens of New Jersey, must have spread to Newfoundland, where now they form an isolated flora.

EUPHORBIA ARUNDELANA, AN ALLY OF EUPHORBIA IPECACUANHAE.

HARLEY HARRIS BARTLETT.

DR. MILLSPAUGH has said that "the singular and extremely amorphous" *Euphorbia Ipecacuanhae* "represents in itself seven 'Rafinesquian species,' so greatly does it vary in form, color, inflorescence and leaf." No one who has seen the plant in nature will dispute the statement. The leaves vary from linear to broadly ovate, and between two plants of the same leaf shape, growing in the same square foot of soil, there is often a difference of several hundred percent in the size of the leaves. Some plants are entirely purple, some pale green, in others the purple pigment is definitely localized in certain organs. A colony of *Euphorbia Ipecacuanhae* consists of a host of forms, different enough from one another so that they can be assembled into groups of like individuals. De Vries [1] believes that the species is in a mutable condition.

In the western part of Anne Arundel County, Maryland, there is a close ally of *Euphorbia Ipecacuanhae*, seemingly undescribed, which may be called *Euphorbia arundelana*. Both species grow together in a small area (equidistant from the bridges which cross the Patuxent River to Laurel and Bowie, Prince George's County) designated as "Sassafras fine sandy loam" [2] on the U. S. Soil Survey sheet of Anne Arundel County.

The essential and striking character of *Euphorbia arundelana* is

[1] "Herr Dr. J. W. Harshberger sandte mir Material von *Hibiscus Moscheutos* und *Euphorbia Ipecacuanha* aus Pennsylvania, welches durch den auffallenden Reichthum an Formen auf eine Mutationsperiode für diesen Arten schliessen lässt." De Vries, Die Mutationstheorie, II, p. 664.

[2] This soil type is a brownish or deep yellow sandy loam, heavy at the surface, but lighter in color and texture as the depth increases. "At 26 to 30 inches it passes into a sand or loamy sand varying in color from a light yellow to a reddish brown.... The loose open character of the subsoil allows excessive moisture to pass readily through it, while at the same time the texture of the soil gives it a good water-holding capacity.... The material composing the soil is a marine sediment washed down from the higher lands farther north.... The particles are sharp and angular, indicating that the soil has not been water-worn to a great extent.... The Sassafras fine sandy loam occurs principally in the southern and western parts of the country.... It is found at elevations ranging from 40 to 150 feet above tide." J. C. Britton and C. R. Zappone, Soil Survey of Anne Arundel County, Maryland. (Advance Sheets — Field Operations of the U. S. Bureau of Soils, 1909.)

the presence of broad white appendages, often tinged with pink, on the involucral glands. *E. Ipecacuanhae* has often been described as having exappendiculate glands, but Norton [1] has pointed out that a narrow green appendage is always present. Partly on this ground he excluded the species from the subgenus *Tithymalus*. Dr. Small[2] transferred it to *Tithymalopsis*, and the discovery of *E. arundelana* shows that its affinity is really with the members of this group. In *E. Ipecacuanhae* the appendage is so inconspicuous as to be easily overlooked, in *E. arundelana*, on the other hand, it is quite as conspicuous as in the familiar *E. corollata*. (Compare the text figures.) The range of variation seems to be as great in *E. arundelana* as in *E. Ipecacuanhae*, but the two series of forms present the following contrasting characters. 1) Some forms of *E. arundelana* (not all) are pubescent. In Anne Arundel County there seem to be no pubescent forms of *E. Ipecacuanhae*, nor are there any pubescent specimens of it in the National Herbarium. The presence of pubescence is therefore diagnostic; its absence is not. 2) In the forms of *E. arundelana* the stems are prevailingly of strict, upright habit, whereas those of *E. Ipecacuanhae* tend to be spreading or decumbent. In other characters the two species are strikingly alike. It is especially noteworthy that the finger-thick, deep, vertical roots are indistinguishable.

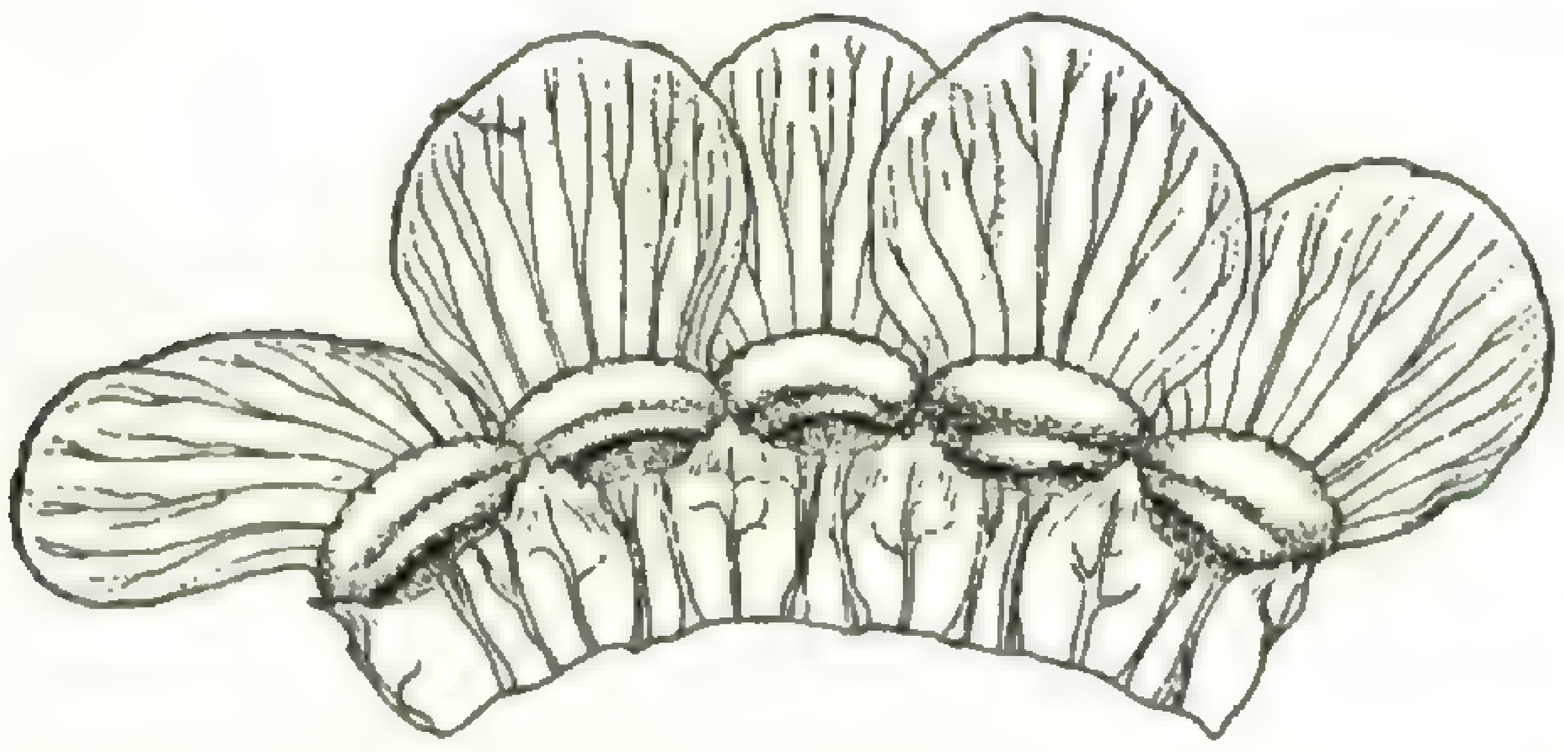


Fig. 1. Euphorbia arundelana. Expanded involucre showing broad appendages. (× 5)

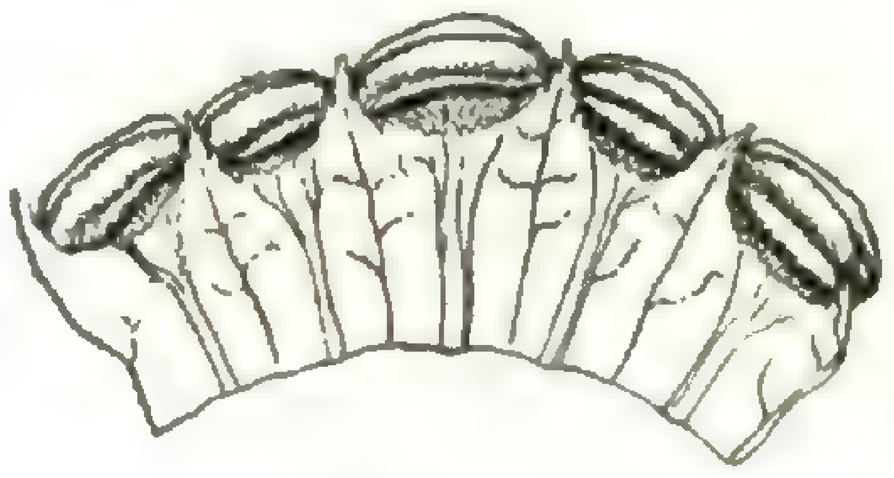


Fig. 2. Euphorbia Ipecacuanhae. Expanded involucre showing very narrow appendages. (× 5)

Euphorbia arundelana sp. nov. Herba perennis habitu *Euphorbiae Ipecacuanhae* simillima. Radix perpendicularis longissima crassitudine circa 1 cm., caulibus subterraneis multiramibus plus minusve tortuosis coronata. Caules plures floriferi annui, altissimi

[1] J. B. S. Norton, Report Mo. Bot. Gard. XI (1900), p. 86.
[2] J. K. Small, Flora Southeastern U. S., p. 1334.

2 dm. attingentes, deorsum alternatim, sursum dichotome vel trichotome ramosi. Folia inferiora squamiformia alterna, superiora verticillata vel saepius opposita, summis exceptis quam internodia multum breviora, amplitudine formaque valde varia, lanceolata vel ovata, mediocria circa 2 cm. longa, sessilia vel brevissime petiolata. Pedunculi erecti in dichotomiis (aut trichotomiis) terminales, quique involucrum unum ferentes, infimi usque ad 7 cm. longi internodia aequantes, summi foliis breviores. Involucrum hemisphaericum glandulis appendice lata patenti conspicua circumdatis.

forma α omnino glabra, foliis caulibusque viridibus; involucri glandulis albo-appendiculatis.

forma β omnino glabra, foliis caulibusque purpureis; involucri glandulis roseo-appendiculatis.

forma γ caulibus, praecipue nodis, foliisque pilosis deinde glabratis, purpureis; pedunculis glabris, involucris extus circulatim ad segmentorum baseis pubescentibus, alibi glabris; glandulis albo-appendiculatis.

In fine sand, southeast of Laurel, Maryland, in Anne Arundel County, 1 May, 1910, Bartlett *1954* (form α), *1955* (f. β), and *1956* (f. γ). The three forms which are defined illustrate the types of variation shown by this species. Other forms are represented by *Bartlett 1952* and *1953*; many more might have been collected.

Since the soil in which *Euphorbia arundelana* grows is agriculturally the best in the region, its native flora is but poorly preserved. The Euphorbias occur in fence corners and in the narrow strips of undisturbed sand between roads and farm fences.

Bureau of Plant Industry, Washington, D. C.

THE MISSOURI RHEXIAS.

B. F. Bush.

The large bright-colored flowers of the Meadow Beauties must be very attractive objects in the sandy swamps of the Eastern and Southeastern States, but in Missouri these plants are so rare that but few collectors have ever seen them growing, and the specimens preserved in the herbarium are very few. Having received from E. J. Palmer some fine specimens of a species of *Rhexia*, collected at Alba, Missouri, in 1909, I was more than commonly interested in determining the species to which these specimens belonged, as I had not seen any plants from so far North as this locality.

I was at first strongly inclined to regard these specimens as belonging to an undescribed species, but after a short study of the plants, I referred them to *Rhexia mariana* L., a species that had been collected several times in Missouri.

However, feeling some doubt as to my disposition of these specimens, I took up the study of the species of *Rhexia* that had been collected in Missouri, and through the kindness of Prof. Trelease was enabled to examine all of the Missouri material of this genus, as well as some specimens from other States, preserved in the Herbarium of the Missouri Botanical Garden.

A careful comparison of this material satisfied me that the plants collected by Mr. Palmer belong to an undescribed species, and a visit to the locality where the plants were collected, on July 24, 1910, further convinced me of their distinctness from any described species.

The locality where this new species of *Rhexia* occurs, is some four miles north of Alba, Missouri, in Jasper County, on a high prairie, about 1100 feet elevation, along little rocky draws that lead to the lower prairie, a place one would be least likely to think of as the habitat of any species of *Rhexia*, a genus which, as is well known, is commonly found in sandy swamps and bottoms.

Synopsis of the Missouri Species of Rhexia.

Stem quadrangular, wing-angled, with slightly concave sides, low, simple or somewhat branched; leaves sessile, narrowly to broadly elliptical, 2–6 cm. long, 10–25 mm. broad, pointed at both ends, broadest at about the

middle, aristulate-tipped, 3-nerved; calyx-tube distinctly and usually rather copiously bristly-hispid . . . . . 1. *R. latifolia*, n. sp.
Stem cylindric, slender, low, hirsute-pubescent; leaves short-petioled, oblong or linear-oblong, acute at the apex, narrowed at the base, 2–4 cm. long, 4–10 mm. broad, 3-nerved; calyx-tube essentially smooth or with a few scattered bristles . . . . 2. *R. mariana.*
Stem square, stout, tall, slightly pubescent or nearly glabrous; leaves nearly sessile, ovate or ovate-oval, acutish, 2–5 cm. long, 2–4 cm. broad, 3–5-nerved, veiny . . . . 3. *R. virginica.*

1. **Rhexia latifolia** n. sp., erecta simplex vel leviter ramosa 4–6 dm. alta; caule alato-quadrangulari cum pilis rectis patentibus 1–3 mm. longis tecto, faciebus leviter concavis; foliis sessilibus vel subsessilibus anguste vel late ellipticis 2–6 cm. longis 10–25 mm. latis apice basique acutis in media parte latissimis, apice aristatis, supra lutei-viridibus cum pilis rectis sparsis 1–1.5 mm. longis et inter se 1–2 mm. distantibus praecipue inter nervias obsitis, subtus pallidioribus valide 3-nerviis cum pilis praecipue innerviis munitis, margine obscure serrulatis, dentibus minimis; inflorescentia puberula foliosa saepe ramosissima, ramulis gracilibus adscendentibus vel erectis; floribus terminalibus vel in axillis superioribus purpureo-roseis 20–25 mm. diametro breviter (1–2 mm. longe) bracteatis, bracteis lineari-lanceolatis; tubo capsulae globoso ca. 4 mm. longo pilis longiusculis hispido supra in collum subaequilongum vix constricto; dentibus calycis lanceolatis saepissime a fructu deciduis; seminibus stramineis rugosissimis.— Plants 4–6 dm. tall, erect, simple or somewhat branched. Stems quadrangular, wing-angled, with slightly concave sides pubescent with straight spreading hairs 1–3 mm. long. Leaves sessile or nearly so, narrowly to broadly elliptical, 2–6 cm. long, 10–25 mm. broad, pointed at each end, broadest at about the middle, aristulate-tipped, upper surface yellowish-green, with straight scattered hairs 1–1.5 mm. long, and 1–2 mm. apart, mostly between the nerves, the lower surface paler, the hairs mostly along the nerves, strongly 3-nerved, faintly serrulate with long, shallow, ciliate teeth. Inflorescence puberulent, leafy, often much-branched, with slender ascending or erect branchlets. Flowers terminal and in the upper axils, deep purplish-pink, 20–25 mm. broad, on short (1–2 mm. long) pedicels, subtended by linear-lanceolate bracts. Body of capsule globose, about 4 mm. high, with constricted neck of about equal length. Calyx-teeth lanceolate. mostly deciduous from the fruit. Seeds straw-colored, very rugose. High prairies and barrens, Southern Missouri, Arkansas and Oklahoma. Summer and Autumn.

Specimens examined: *Missouri*: Alba, *Bush* 6070, July 24, 1910, type; *Palmer*, July 24, 1910, co-type; *Palmer* 2432, July 7, 1909; Waco, *Palmer*, 923, September 21, 1906; 949, September 21, 1906; 1100, August 11, 1907; 1256, October 4, 1908. *Arkansas*: Hot Springs, *Trelease*, September 3, 1897. *Oklahoma*: Sapulpa, *Paul J. White* 101, August 11, 1900.

2. Rhexia mariana L. Sp. Pl. 346, 1753. A species of sandy swamps, New Jersey to Florida, mostly along the coast, West to Louisiana and Texas, North along the Mississippi river to Southern Missouri, Illinois and Kentucky.

Specimens examined: Missouri: Butler County, *Eggert*, July 27, 1892; Campbell, *Bush* 145, July 20, 1893; Pleasant Grove, *Mackenzie* 322, July 17, 1897; *Bush*, 274, August 13, 1899; Neelyville, *Russell*, July 4, 1899.

3. Rhexia virginica L. Sp. Pl. 346, 1753. A species of low meadows and sandy swamps, ranging from Maine to New Jersey and Florida, mostly near the coast, West to Louisiana, and North along the Mississippi river to Southeastern Missouri and Southern Illinois.

Specimens examined: Missouri: Malden, *Bush* 146, July 22, 1895: Pilot Knob, *Glatfelter*, August 20, 1895.

Courtney, Missouri.

LYCOPODIUM FLABELLIFORME.

W. H. Blanchard.

Lycopodium flabelliforme (Fernald), n. sp. *L. complanatum*, var. *flabelliforme* Fernald, Rhodora, iii. 280 (1901); Gray's Man. ed. 7, 57 (1908). Caule repenti superficiali, ramis 2–3 dm. altis rigidule erectis mense Octobri tertio vel quarto anno fructiferis, hornotinis usque ad 3 cm. attingentibus profunde bipartitis, partibus 5–7-furcatis, lobis dorso planis vel convexis subtus concavis 2–3 mm. latis rarenter secundo anno procrescentibus; foliis minutis adpressis, pedicellis robustis saepe furcatis, pedunculis ca. 7 cm. longis robustis viridibus ab apice erecto lato vel primae vel hinc inde ulterioris furcationis et quam ea uno anno tardius evolutis.

Running stem nearly superficial; upright parts 2–3 dm. high, stiffly erect, maturing fruit in October after third or fourth year; upright stem extension 3 cm. yearly, bearing two branches 5- to 7-forked, flat or convex above, concave below, 2 to 3 mm. broad, branchlets rarely extending the second year; leaves minute, adpressed; strobiles 4 (or rarely 5) $2\frac{1}{2}$ to 4 cm. long, often pointed, on stout, twice forked pedicels; peduncles 7 cm. long, stout, green, from broad erect end of first or sometimes more remote forking of branches, and growing in year following the production of branch.

I propose to show that there is abundant reason for according specific rank to this plant and incidentally to show that it is unique

among our club mosses. It is as distinct from *L. complanatum* L. as is *L. tristachyum* Pursh, and it would do no more violence to a natural classification to make the latter a variety of *L. complanatum* as has been done though perhaps unwittingly as *L. complanatum*, var. *Chamaecyparissus* Milde., than to continue *L. flabelliforme* a variety of *L. complanatum.* The two plants *L. complanatum* and *L. tristachyum* have several distinctive characters in common — they have underground rootstocks, ripen their fruit early in the season, have slender peduncles growing from nearly similar points, and enlarge by growth from the ends of all branches, while *L. flabelliforme* has different or just the opposite characters.

L. complanatum is a skeleton-like, unattractive plant with rootstocks usually well down in the leaf-mould or soil, and the stems arise like distinct plants rather than like those of a trailer. In order to secure a specimen with its rootstock vigorous digging is necessary. One would hardly think of gathering it for decorative purposes. The early maturing strobiles are hardly an inch (2 cm.) long, from one to three in number, more commonly one, borne on a slender peduncle from $1\frac{1}{4}$ to 2 inches (3 to 5 cm.) long. The pedicels are very short, often apparently wanting, and the two strobiles when there are two arise side by side nearly or quite touching. The strobiles are sometimes forked being single at the base and the forking at any place above. The fruiting part appears to be a very insignificant portion of the plant and during the fall season is hardly noticeable, but it remains like that on *L. flabelliforme* though somewhat battered through several years.

L. flabelliforme has a regular, stocky, very attractive appearance; the rootstock is usually almost on the surface of the ground and the plant is used like a vine for decorative purposes and can well be compared with *L. clavatum* L. for such uses, while *L. complanatum* can only be used like *L. obscurum* L. The four (sometimes five) strobiles averaging about an inch (2.5 cm.) long, but varying much and often having a long point, maturing very late in the season, mark very distinctly the outline of a square prism, and are immediately supported by prominent two-forked pedicels borne on a stout, erect peduncle about 3 in. (7 cm.) in length. The fruiting part is thus very prominent.

But *L. flabelliforme* is also distinguished from *L. complanatum* by its method of growth which I think is unique in this genus and is of

especial interest in distinguishing this species from other much-branched ones. According to my observation, in all club mosses except *L. flabelliforme* the ends of all branches and stems are growing points, are tipped with buds. The end of each season's growth is marked by a joint, the position of which in some species *L. annotinum* and *L. clavatum* for examples is very noticeable. In *L. complanatum* the leaves being very minute the axis is practically naked and, marking the end of each season's growth, there is plainly shown a sharp constriction resembling the separation of the thorax and abdomen of a wasp, and each year's growth resembles an elongated sausage.

The growth of *L. flabelliforme* is entirely upward, that is it does not increase laterally. Its growth consists of an annual elongation of the stem of about $1\frac{1}{2}$ inches (3 to 5 cm.) which, a short distance ($\frac{1}{2}$ to 1 cm.) below the top of the terminal bud, sends out two branches which fork and re-fork from five to seven times and result in giving a striking resemblance to a funnel or tunnel with its sides rising at an angle of 30° from a perpendicular, the slant height of the inverted cone being $1\frac{1}{4}$ to 2 inches (3 to 5 cm.). A branch or a part of a branch when flattened has the appearance of a fan, the fact being that it is funnel-form in the field and flabelliforme in the herbarium. Growth from the ends of these branchlets rarely takes place indicating that they are commonly either destitute of buds or that the buds are dormant and the plant grows (except in rare instances) only by a succession of funnel-bearing increases of stems, the funnels completed (except rarely) the first season.

This feature in the structure of this species can be finely shown by comparing *L. tristachyum* or *L. obscurum* with *L. flabelliforme* in the field when the new growth is appearing or is just grown, or by comparing them in the herbarium if secured at this time. If they are exposed to the sun or dry air when secured the new growth soon wilts and the former two will be covered with a wilted fringe, while the latter shows no wilting except the upmost story which will wilt beyond recognition.

L. complanatum makes an annual upward growth according to the same general plan as *L. flabelliforme* which plan however is obscured in the manner of its carrying out. The stem additions are more slender, zigzag, the terminal bud less conspicuous, while the pair of branches are at first very small though unlike *L. flabelliforme* they increase by lateral forking for two or three years.

Not all of the upright parts of these plants ever fructify in either species. Those that do not and which in consequence are often called sterile, continue to increase in the same manner as at first, the fifth year's growth of *L. flabelliforme* being a duplication of the second, etc. The others which by contrast may be called fertile when three or four years old make a change. In *L. flabelliforme* half of the first forking of each branch instead of forking again and again, develops into a broad stem-like segment often one half of an inch high (1.2 cm.) from which the next season the stout peduncle ascends. From this time on the energy of the plant is put into fruiting and the branches, now reduced to one-half of their former breadth, become smaller and smaller in each year's addition, giving the fertile upright parts, or "plants" conical appearance while the sterile ones appear cylindrical. Sometimes the fruiting is from the second or even the third forking but not often. In *L. complanatum* the fruiting is from the second forking generally, but often from the third, and as might be supposed the branch end from which arises the slender peduncle is little or no different in appearance from the others, and the fertile and sterile branches are not noticeably different except, as has been stated already, that the fruiting parts more or less entire always remain, but unlike those of *L. flabelliforme* these are not conspicuous.

Both species are often 12 inches (3 dm.) high "over all." If *L. complanatum* had the stout, erect stem of *L. flabelliforme* it would be much taller. The extreme age any of the upright stems attain is problematical, perhaps ten years. I have had a pretty intimate acquaintance with *L. flabelliforme* for at least ten years, but not till 1909 did I get acquainted with *L. complanatum.* My specimens which I have used in the preparation of this paper and which I collected very carefully and deliberately and in goodly numbers, given in a thin hard woods in Caribou, Maine, in the latitude of Quebec, 46° 50′.

I assume that our American form of *L. complanatum* is the same as the European, but I am not sure. Then again there may be other species sheltered under that name. Two have now been segregated and in my northern searches for *Rubus* I saw some forms of *L. complanatum* which I did not carefully examine but which I suspect were at least not typical.

WESTMINSTER, VERMONT.

A STRIKING COLOR FORM OF VIOLA PEDATA.

A. Louisa Sanders.

In many of the towns of eastern Massachusetts are places locally noted for the profusion of *Viola pedata* to be found there. One such place in Wayland is on Reeve's Hill. About twelve years ago my attention was particularly drawn to the place by the discovery of a single deep colored specimen which was then pronounced dark red. Although the spot has been watched carefully no recurrence of this form has been seen.

While gathering some of the delicately fragrant blossoms of the species there recently, I found two plants whose flowers did not have the usual pale-violet color. Instead, the petals of each were a beautiful pale magenta. This made the specimens so different from the common form that they may be proposed as

Viola pedata L., forma **rosea**, forma nova, habitu var. *lineari-lobae* simillima differt solum petalis omnibus laete roseis.— Sunny southern exposure of a rocky hillside, Wayland, Massachusetts, May 14, 1911.

The plants were about 5 cm. apart, growing in somewhat loose, but not sandy soil, at the edge of a clump of huckleberry bushes. One had four blossoms and the other three, each perfectly formed and of the usual size and shape. Even the white part of the lower grooved petal was not lacking although it was not crossed by the customary dark veins. One of the specimens may be seen at the Gray Herbarium; the other is still living, but unfortunately has formed no fruit.

It was interesting to find on the same day and not ten rods from the above forms, two specimens of the rare white bird-foot, *Viola pedata*, forma *alba* (Thurb.) Britton, and to note that each had fruited. It recalled the pleasure experienced about ten years ago of finding the white ones for three successive seasons in the same locality.

Wayland, Massachusetts.

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TYPE OF THE GENUS PANICUM.

A. S. Hitchcock.

In a recent article[1] Dr. J. A. Nieuwland has discussed the Type of the Genus Panicum. The author maintains that the name Panicum should be applied to the group containing the historic type, *Panicum italicum*, and that the group to which the name is applied by recent authors, and which contains such species as *Panicum dichotomum* L. and *P. capillare* L., should receive a new name. For this group he proposes the name Chasea, and lists under this name several species of Panicum.

Due probably to his limited library and herbarium facilities and his unfamiliarity with the group of grasses involved in the discussion, the author has made a variety of errors. It seems worth while placing upon record certain corrections as to facts together with a few statements concerning differences of opinion.

I agree with the author that the historic type of Panicum is *P. italicum* L. If the name Panicum should be applied to the group containing *P. italicum* L., then the name Milium should be applied to the genus containing *P. miliaceum*, the historic type of Milium. It may be remarked that, after 1753 the name Panicum was used in this sense by Miller, Adanson, and Moench, and more recently by Bubani.[2] The whole subject of the type of the genus Panicum has been discussed in the recent revision of the North American species[3] which, however, Dr. Nieuwland apparently has not seen.

[1] The American Midland Naturalist **2**: 60. 1911.
[2] Fl. Pyren. **4**: 261. 1901.
[3] Contr. Nat. Herb. **15**: 11–15. 1910.

The author attempts to defend his opinion by citing the rules of the Vienna Code. I submitted this very question to Prof. A. Engler, who stated that according to the rules, when the Linnaean genus Panicum was divided the name should go with the group having the greater number of species. It must be borne in mind that the Vienna rules do not dictate the historic type of a genus as the type species to be chosen. Linnaeus himself indicates no type but does make it evident from his description of the genus Panicum and his note appended to that description [1] that he does not consider as typical those species with awns or involucrate bristles. I believe that according to either the Vienna or the American Code, the name Panicum should be applied to the group containing *P. miliaceum* and that under no set of principles is the publication of the new name Chasea justified.

Dr. Nieuwland cites Linnaeus' Philosophia Botanica (pp. 167 and 168) as authority for applying the name Panicum to the involucrate species. But by the same authority he should apply the name Milium to the group he has named Chasea.

The author assumes that "Fernald and Robinson" and "Parrish" are not following the Vienna Code, when the name Setaria is retained for the involucrate species of Panicum, since there is an earlier homonym, "Acherson [Acharius] having given it to a group of lichens in 1798." Dr. Nieuwland has overlooked the provision of Article 50, "No one is authorized to reject....a name....because of the existence of an earlier homonym which is universally regarded as non-valid...."

But, after deciding that the name Panicum should apply to the genus usually known as Setaria or Chaetochloa he says, "This procedure leaves the other genus hitherto called Panicum by the authors, without a name, as far as I am able to ascertain, and I propose that of Chasea." However there are already several published names available, among which may be mentioned, Urochloa Beauv. 1812, based on *U. panicoides* (*Panicum Helopus* Trin.); Paractaenum Beauv. 1812; Steinchisma Raf. 1830; Eriolytrum Desv. 1830; Phanopyrum Nash, 1903. It might be inferred that the author excludes all the above groups from Chasea were it not for the fact that he considers as synonyms of Panicum (Chaetochloa) the very distinct genera Ixophorus Schlecht. and Chamaeraphis "R. Br. 1810 (?)."

[1] Linn. Gen. Pl. ed. 5. 29. 1754.

Dr. Nieuwland states concerning Setaria Beauv. as a homonym, "Scribner recognizing this, called the genus Chaetochloa, but it had already been given a name, Ixophorus by Schlechtendal in 1861–62." I fear that Dr. Nieuwland did not read what Schlechtendal says, for the latter in proposing the genus Ixophorus (based on *Urochloa uniseta* Presl), shows how it differs from Setaria. Schlechtendal's article [1] was published in 1862, not "1861–1862."

I would call attention to what might be considered a defect in technique, namely, basing the new name Chasea on "Panicum of the authors not of Linnaeus or only in part." Panicum "of the authors" is very indefinite. The reader is led to infer the application of the name from the species included. It is especially misleading since half of the species mentioned were included in Panicum by Linnaeus. It would have been more satisfactory, or at least more definite, if the author had indicated a type species, or based the name Chasea upon the Panicum of a definite author.

Dr. Nieuwland transfers certain species of Chaetochloa to Panicum and other species of Panicum to Chasea. *Panicum occidentale* Nieuwl. (*Chaetochloa occidentalis* Nash), is invalidated by *Panicum occidentale* Scribn. 1899. *Panicum versicolor* Nieuwl., based on *Chaetochloa versicolor* Bicknell, is invalidated by *Panicum versicolor* Doell, 1877. *Chasea pubescens* Nieuwl. is based on *Panicum pubescens* Lam. But as has been shown in another place,[2] the name to be used for this species, under Panicum, is *P. scoparium* Lam. *Chasea prolifera* Nieuwl., based on *Panicum proliferum* Lam., is untenable because the latter name is a synonym of *P. miliare* Lam. The author probably intended to transfer *P. dichotomiflorum* Michx. to which the name *P. proliferum* has been applied by some American botanists.

Another name, *Chasea violacea* Nieuwl., based on "*Panicum violaceum* Linn." is unfortunate, as there is no such species. There is a *Panicum violaceum* Lam., which is a species of Pennisetum. It is possible the author meant *Panicum miliaceum* L. but the difference can scarcely be explained as a typographical error.

It is well to mention certain variations in methods of technique in the bibliographic citations. For example, "Panicum virgatum Linn., 1753"; when the author's name is abbreviated it is followed

[1] Linnaea **31**: 420. 1862.
[2] Contr. Nat. Herb. **15**: 294. 1910.

by period and comma in fifteen cases, and by period only, in eight cases. When the name is not abbreviated it is usually followed by a comma but a period is used after Nash is one case. The name Scribner is abbreviated three times as "Scribn.," twice as "Scrib.," and once is unabbreviated. In one case a period is placed after Nash in parentheses, and in another case between the name and author. In the citation "Setaria Beauvais, 1812 not Achers., 1798," it may be pointed out that the first author spelled his name "Beauvois" in his "Essai," and the second author referred to is Acharius. Chaetochloa Scribn. was published in 1897 and not 1791. *Setaria italica* was published by Roemer and Schultes in 1817 and not 1897. *Panicum dichotoma* should be *Panicum dichotomum.*

These errors are in part typographical and concern non-essentials but an unusual number may indicate carelessness, and carelessness in non-essentials may give the impression of carelessness in essentials.

It may be noted that the author abbreviates his name as, "Nwd." This is not in accordance with general usage nor in conformity with the recommendation of the Paris Code (Art. 52, especially the commentary thereon, where it is shown that the abbreviation Hkr is susceptable of 2209 interpretations, provided the name begins with H and there are only two other consonants, and not including the combination of vowels i e u).

The above notes emphasize the principle that details of nomenclature should not be considered apart from the study of the organisms concerned, and that it is necessary for an author to be familiar with the group of plants whose nomenclature he attempts to rectify. It is well to heed Article 4 of the Vienna Code, that next in importance to (1) fixity of names, and (2) the avoidance or rejection of names which may cause error or confusion, is the avoidance of all useless creation of names, otherwise the situation is beclouded rather than clarified.

Bureau of Plant Industry, Washington, D. C.

NOTES FROM THE PHAENOGAMIC HERBARIUM OF THE NEW ENGLAND BOTANICAL CLUB,— II.

M. L. Fernald.

The announcement of the summer meeting of the Josselyn Botanical Society of Maine to be held at Brunswick, August 22–25, 1911, makes it appropriate to select from a large mass of Maine notes the following items which may be of special interest to those planning to attend the field-meeting and which will suggest many points for further observation, especially with the possibility of range-extensions. These notes may be called

Some Notable Plants of the Brunswick Region.

Aspidium simulatum Davenp. The only stations yet known in Maine are the original one described by Davenport when he published the species (Indian Point, Georgetown, June, 1893) and wet woods at Southport (*M. L. Fernald*, August 1, 1894). These stations so nearly approach Brunswick that the species should be sought there — in Red Maple swamps and similar habitats.

Potamogeton pectinatus L. The only Maine specimens seen by the writer came from brackish pools along Winnegance Creek, Phippsburg (collected in flower August 23, 1909).

Lophotocarpus spongiosus (Engelm.) J. G. Smith. Brackish mud of ditches, rills, etc., Winnegance Creek, Phippsburg, September 21, 1907 (*Kate Furbish*), August 23, 1909 (*Fernald & Wiegand*). See Rhodora, xii. 120 (1910).

Agrostis alba L., var. aristata Gray. One of the few stations known to the writer is a patch of low woods at Southport (August 8, 1894). The variety is also found at Fairfield (*J. A. Allen*) and should be sought elsewhere.

Trisetum spicatum (L.) Richter, which is rare in southern Maine, was collected by Miss Furbish at Brunswick, in 1878.

Eragrostis pilosa (L.) Beauv. was collected by Miss Furbish at Harding's, Brunswick, in 1899. It is apparently spreading northward along the railroads.

Eragrostis megastachya (Koeler) Link, another species which, like the preceding, is apparently traveling northward on railroad filling and ballast, was collected by Miss Furbish at Brunswick in August, 1891.

Agropyron pungens (Pers.) R. & S., one of the least known of our American grasses, occurs on beaches or dry marshes from Pine Point to Cumberland and on Monhegan Island. It is probably somewhat general along the southern half of the Maine coast but is as yet known only from the points named and at stations on Cape Elizabeth at one of which it was first detected by Tuckerman in 1860.

Cyperus Nuttallii Eddy. The northernmost station known to the writer is on the brackish marsh by Winnegance Creek, Phippsburg (*Kate Furbish*, September 14, 1907; *Fernald & Wiegand*, August 23, 1909). See Rhodora, xii. 120 (1910).

Eleocharis olivacea Torr., a comparatively rare species in Maine, occurs in tidal mud of the Androscoggin River at Brunswick (*Kate Furbish*, October, 1891; *C. A. Davis*, August 1, 1894). It also grows in brackish mud at Winnegance and may prove to be somewhat generally distributed throughout the region.

Eleocharis diandra C. Wright. The station described by Dr. Charles A. Davis in Rhodora, iv. 2 (sand- and mud-banks of the Androscoggin, covered at high tide, Brunswick) is the only one yet known in the state.

Eleocharis rostellata Torr. The station (salt marsh along Winnegance Creek, Phippsburg) recorded in Rhodora, xii. 120 and 135 is the only one known in Maine.

Scirpus Smithii Gray, var. setosus Fernald. Muddy bank of the Androscoggin River, Brunswick, August 1, 1894 (*C. A. Davis*), September 15, 1904 (*Kate Furbish*). The only Maine station known.

Scirpus fluviatilis (Torr.) Gray. Winnegance Creek, Phippsburg, September 14, 1907 (*Kate Furbish*), August 23, 1909 (*Fernald & Wiegand*). The only authenticated station in Maine. See Rhodora, xii. 120, 134 (1910).

Scirpus campestris Britton, var. novae-angliae (Britton) Fernald. Harding's, Brunswick, September 13, 1891 (*Kate Furbish*).

Carex aenea Fernald. The southernmost Maine stations known to the writer are in dry woods at Southport (*Fernald*, July 31, 1894) and on cliffs at Christmas Cove, Bristol (*J. R. Churchill*, July 8, 1903).

Carex prasina Wahlenb., one of the rarer species of Maine, was collected at Brunswick by C. A. Davis in 1894.

Carex vestita Willd. The most northeasterly point known for this species is at Brunswick, where it was collected June 15, 1898, on a sandy embankment by E. B. Chamberlain. See Rhodora, vi. 194 (1904).

Peltandra virginica (L.) Kunth. In 1870 Miss Furbish found *Peltandra* in an Alder swamp at Brunswick, a station which has since been obliterated (See A. H. Norton, Rhodora, iv. 168). In 1900 Mr. Norton discovered it at Cornish, and there is an old record of the plant at South Berwick (see Rhodora, l. c.). Besides material from Brunswick and Cornish there is in the Club Herbarium a very characteristic sheet of specimens collected by Miss Furbish at Livermore Falls in 1878. The species should be watched for throughout southern Maine — in Alder swamps and bottom-lands.

Juncus effusus L., var. decipiens Buchenau. The only Maine station known for this slender variety (see Rhodora, xii. 87) is a moist thicket at Southport (*Fernald*, July 31, 1894).

Juncus acuminatus Michx. The northeastern limit of this species, as far as known, is along Winnegance Creek, Phippsburg, where it was collected by Miss Furbish, July 11, 1899.

Aletris farinosa L. The only Maine specimens known to the writer are two inflorescences collected by Miss Furbish in 1874 at Harding's, Brunswick.

Smilax rotundifolia L. The most northeasterly station for the Catbrier known to the writer is a rocky bank at Cape Popham, Phippsburg.

Leucojum aestivum L. Reported in the 2d Supplement to the Portland Catalogue (1897) as "thoroughly and abundantly established for 15 years in a brook whence it is rapidly spreading, Brunswick (Joshua L. Chamberlain)." Specimens collected by Miss Furbish in 1899 are in the Club Herbarium.

Habenaria dilatata (Pursh) Gray. There are specimens in the Club Herbarium collected by several botanists at various times at Brunswick, but only one from farther south in Maine: Cumberland (*E. B. Chamberlain*).

Habenaria macrophylla Goldie. Among the Maine stations for this splendid species should be noted Brunswick (*Kate Furbish*).

Salix pellita Anders. The most southerly station in Maine is at Foster's Point, West Bath, where Miss Furbish collected it in 1892.

Rumex persicarioides L. One of the few Maine stations for this

most distinct Dock is at Fort Popham, Phippsburg (*Kate Furbish,* September 14, 1907).

Polygonum Fowleri Robinson. The southernmost known station for this species is at Cape Newagen, Southport, where the writer found it in August, 1894. In eastern Maine it is common on the strand and at edges of salt marshes and should be sought for at other points west of Penobscot Bay.

Polygonella articulata (L.) Meisn. The northeastern limit of this characteristic plant of coastal sands seems to be at Fort Popham, Phippsburg.

Chenopodium humile Hook. In August, 1906, Miss Furbish sent to the Gray Herbarium a couple of plants of this species from a ditch at Brunswick. The station is the only one known in the East for this species which is ordinarily found in brackish or saline regions of the Northwest.

Atriplex patula L., var. littoralis (L.) Gray, which is much less common than var. *hastata,* was collected by Miss Furbish at Foster's Point, West Bath, July 28, 1902.

Suaeda linearis (Ell.) Moq. is unknown in Maine from east of Brunswick. It was collected by Miss Furbish at Harding's in September, 1899.

Arenaria groenlandica (Retz.) Spreng. In the 2d edition of Gray's Manual this was reported from "Bath, Maine, on river-banks near the sea," but the original label in the Gray Herbarium of the plant collected by William Gambel reads: "rocks of the Ken[n]ebec near Bath." In the Club Herbarium are specimens from Bath (*Kate Furbish*) and from a rocky bank at Cape Popham, Phippsburg (*Fernald*). It is probable that the *Arenaria* is to be found at other stations in the region.

Ranunculus pennsylvanicus L. f. There are no Maine specimens in the Club Herbarium from south of Brunswick, and its southern limit in Maine is probably in that region.

Potentilla Anserina L. The typical pubescent plant (see Rhodora, xi. 8) which, as far as known, is confined in Maine to the valleys of the St. John, Penobscot, and Androscoggin Rivers, occurs at Topsham (*Kate Furbish,* 1870).

Rosa acicularis Lindl., var. Bourgeauiana Crépin. One of the few New England stations for this characteristic northern rose is at Foster's Point, West Bath, where it has many times been collected by Miss Furbish on "high land, on beach."

EUPHORBIA POLYGONIFOLIA L. is confined in Maine to the southwestern coast, the northernmost stations apparently being on the sands of Brunswick (*Kate Furbish*), Phippsburg (*Kate Furbish, M. L. Fernald*), and Georgetown (*H. M. Noyes*).

EUPHORBIA HELIOSCOPIA L., common in northern Maine but rare southward, was collected by Miss Furbish at Brunswick in 1885.

EUPHORBIA PEPLUS L., another unusual species, has been known as a garden weed in Brunswick for more than forty years (*Kate Furbish*).

COREMA CONRADII Torr. One of the earliest known stations for *Corema* was "in rupestribus aridis, prope Bath, Mainensium."[1] The plant was actually found in 1840 by William Gambel, a pupil of Thomas Nuttall, "on the rocky banks of the Kennebec, in the neighbourhood of Bath,"[2] and Redfield collected it August 5, 1884 on "barren rocky knolls on a wooded ridge 2 miles west of Bath." There are other stations in the Brunswick region: Gun Point, Harpswell (*Kate Furbish*); "every rocky place," Southport (*M. L. Fernald*); and dry ledges, Bristol (*E. B. Chamberlain*). In all these stations as elsewhere in its range the shrub grows in highly silicious soils and it will be interesting to determine to what extent it occurs in the region of the lower Kennebec and Androscoggin.

TILIA CORDATA Mill., one of the common European Lindens planted in America, seems to be established at Brunswick (Harding's) and at Foster's Point, West Bath, where Miss Furbish has several times collected it.

HELIANTHEMUM CANADENSE (L.?) Michx. is much less common in Maine than *H. majus* which extends eastward into the Penobscot Valley. The most northeastly station for *H. canadense* represented in the Club Herbarium is "The Park," Brunswick (*Kate Furbish*, August, 1903).

HUDSONIA ERICOIDES L., a local species in Maine, occurs at several stations slightly south of Brunswick: Small Point (*Edith Boardman*, 1888), Cape Popham (*M. L. Fernald*), and Hunnewell Point (*C. G. Atkins*).

HUDSONIA TOMENTOSA Nutt. is not represented in the Club Herbarium from east of the Kennebec. The easternmost specimens are from Fort Popham (*M. L. Fernald*, 1894) and from Hunnewell Point (*C. G. Atkins*).

[1] Gray, Chloris Bor.-Am. 4 (1846). [2] Gray, l. c. 6.

Viola Brittoniana Pollard. The only Maine material seen of this cut-leaved *Viola* was collected at Georgetown, July, 1900, by Miss H. M. Noyes (now Mrs. Hollis Webster).

Myriophyllum spicatum L. The only Maine material of this species (which about the Gulf of St. Lawrence prefers brackish water) seen by the writer is from Winnegance, Phippsburg (*Kate Furbish*, 1896).

Kalmia latifolia L. is a local species in Maine. One of its few stations is on Great Island, Harpswell (*Kate Furbish*, August, 1900).

Gaylussacia baccata (Wang.) C. Koch, forma leucocarpa (Porter) Fernald. The only station in Maine for the white-fruited huckleberry seems to be Miss Furbish's colony at Brunswick.

Vaccinium Vitis-Idaea L., var. minus Lodd., a rare plant south of Penobscot Bay, is found at "the Gurnet," Brunswick, and at Harpswell (*Kate Furbish*).

Samolus floribundus HBK., an extremely local plant in Maine, is abundant along rills in the brackish marsh of Winnegance Creek, Phippsburg, flowering from July to September. See Rhodora, xii. 120 (1910).

Gentiana linearis Froel. occurs at several stations in Cumberland and adjacent counties, among them Brunswick and West Bath (*Kate Furbish*).

Bartonia virginica (L.) BSP. is local on the Maine coast. In the Club Herbarium there is good material collected in August, 1900, at Georgetown by Miss H. M. Noyes (Mrs. Hollis Webster).

Limosella aquatica L., var. tenuifolia (Wolf.) Pers. The only authenticated station in Maine is in deep brackish mud of Winnegance Creek, Phippsburg. See Rhodora, xii. 120, 143 (1910).

Gerardia virginica (L.) BSP. Although this species extends slightly north of Brunswick, it is apparently rare or local north of Portland. The Club Herbarium contains five different collections of it from Brunswick, one from South Poland, and one from Cumberland; but all others are from farther south.

Odontites rubra Gilib. has long been known from the coast of Lincoln County, on mainland and islands, and is found at some stations (Fort Popham, Cundy's Harbor, etc.) in Sagadahoc and Cumberland Counties. No specimens from nearer Brunswick have come to the writer's attention.

Lonicera dioica L. It is probable that this climbing honey-

suckle reaches its northeastern limit in the Brunswick region. The Club Herbarium has numerous specimens, collected chiefly by Miss Furbish, from West Bath, Harpswell, and Brunswick (bank of Stevens River, "Gurnet," and New Meadows River).

SOLIDAGO RACEMOSA Greene. This very characteristic species, confined to rocks along a few of our northeastern rivers (St. John, Aroostook, Kennebec, etc.) has a fine colony on one of the islands of the Androscoggin at Brunswick.

SOLIDAGO ULMIFOLIA Muhl. The most northeasterly station yet known for this plant (somewhat like *S. rugosa*, but with glabrous stems) is on a rocky bank at Cape Popham, Phippsburg (*M. L. Fernald*, August 6, 1894).

ASTER LINDLEYANUS T. & G. seems to reach its southern limit in Maine in the Brunswick region. The writer has before him five sheets collected by various botanists at Brunswick and one sheet from near Bull Rock Bridge, West Bath.

ASTER TARDIFLORUS L., another northern species, is as yet unknown in Maine from south of Brunswick. It was collected there by Miss Furbish in 1894.

BIDENS HYPERBOREA Greene. The only known region of the United States for this boreal species is the salt marsh along Winnegance Creek, Phippsburg. See RHODORA, xii. 120, 144 (1910), also x. 201 (1908).

SENECIO SYLVATICUS L. This species abounds on the sea-cliffs of eastern Maine (see RHODORA, xii. 106), but the southernmost stations yet known in the state are ledges and cliffs at Southport (*M. L. Fernald*, August 4, 1894) and Georgetown (*H. M. Noyes*, August, 1900).

SENECIO ROBBINSII Oakes is known from East Auburn (*E. D. Merrill*, August, 1896) and from Great Diamond Island, Portland Harbor (*Kate Furbish*, 1887) and should be sought in the intervening territory.

CIRSIUM PUMILUM (Nutt.) Spreng. The most northeasterly station represented in the Club Herbarium is Brunswick, but the plant undoubtedly extends on gravelly and more sterile areas considerably northeast of that region.

GRAY HERBARIUM.

NOTES ON ALGAE, — X.

Frank S. Collins.

A few additions to the North American Flora are recorded in this note, of the blue-green and the red algae; the recent additions to the green algae are not here given. In 1909 the writer published a paper [1] intended to bring together what was known of this group of algae. As usual in such cases, this paper stimulated the study of the group, and in the two years since its publication many additional facts have been received, either as to additional species, or giving fuller information as to species there noted. These additions it is proposed to publish in the course of the year in the Tufts College Studies.

Dermocarpa Vickersiae n. sp. Cellulis vegetativis dense aggregatis, pulvinulos formantibus, margine tenues, centro crassiores; cellulis marginalibus subsphaericis, circa 2 μ diam.; cellulis partis centralis clavatis, ellipsoideis vel subcylindricis, 4–8 $\times$ 2–3 μ; tegumento communi gelatinoso pulvinulum vestiente; colore laete violaceo vel purpureo; gonidangiis late ovoideis vel subsphaericis, ad 12 μ diam., gonidia minuta includentibus.

Vegetative cells densely compacted, forming pulvinulate expansions, thin at the margin, thicker at the center; marginal cells subspherical, about 2 μ diam.; cells of the middle part clavate, ellipsoid or subcylindrical, 4–8 $\times$ 2–3 μ; a general gelatinous coating covering the expansion; color light violet or pink; gonidangia broadly ovoid or subspherical, up to 12 μ diam., containing many minute gonidia. On fronds of *Dictyopteris delicatula* Lamour., Barbados, *Miss Anna Vickers.* Type in herb. F. S. C.; cotype material distributed as P. B.-A., No. 1602.

By the kindness of the members of the family of the late Miss Vickers, there was sent to the writer a very full collection of algae from Barbados, including nearly all the species mentioned in Miss Vickers's publications on the flora of that island,[2] a number of them in sufficient quantity for distribution in the Phycotheca Boreali-Americana. On looking over a set of *Dictyopteris delicatula* for

[1] Collins. The green algae of North America. Tufts College Scientific Studies, Vol. II, p. 79.

[2] Vickers, Liste des algues marines de la Barbade. Ann. Sci. Nat., Ser. 9, Bot., Vol. I, p. 45, 1905.

Phycologia Barbadensis, Paris, 1908.

distribution in this way, delicate pink dots were found on some of the fronds, which proved to be formed by this *Dermocarpa*, apparently new, which I have named for Miss Vickers, whose work will always be of value to American algologists. The volume of beautiful plates, published after her death, represents that part of the work she had planned which was enough advanced for publication.

CALOTHRIX KAWRAISKYI Schmidle, Algen aus den Hochseen des Kaukasus, p. 9, 1897. According to the description by Schmidle, this alga forms rather dense tufts, .50 to .75 mm. high, the trichomes about 4 μ thick in the middle, tapering upwards into a long, slender hair, and suddenly thickened at the base, ending in a wider, hemispherical to ovoid heterocyst; cells varying from one half to one and one half diam. long, blue-green; sheath close, thin and hyaline. This species comes near to *C. Braunii* Born. & Flah., but is of much smaller dimensions in every way.

It is of interest as showing the cosmopolitanism of the smaller fresh water algae, that this species, first found in the Caucasus mountains in 1897, should have appeared in 1906 in a tank in the Physical Laboratory of the University of California, and in 1910, attached to various algae in brooks in Illinois. To Schmidle's description can now be added, Spores 4–5 μ diam., 2–4 diam. long, singly, rarely two, above the heterocyst. This is the fifth species of *Calothrix* for which spores have been recorded, out of the 42 species recorded by Forti,[1] excluding doubtful forms. The genus is distributed all over the world, both in fresh and in salt water, but is much more abundant in the latter; the spore-bearing species, however, are confined to fresh water; one, *C. crustacea*, is normally marine, but is recorded as producing spores only when cultivated in fresh water. This seems reasonable when we remember that spores of this character are contrivances for perpetuating the species over periods of drought, when all the vegetative parts would perish. The *Calothrix* species are specially plants of warm, shallow water; small pools and brooks are often dry in summer, while in deeper bodies of water the decrease in depth would lay bare the region near the shore where *Calothrix* would most abound. The sea level, on the other hand, is practically the same from day to day and year to year; the marine *Calothrix* species usually grow attached to larger plants or in tide pools, and continuously im-

[1] Forti, Sylloge Myxophycearum, Vol. V of De Toni, Sylloge Algarum, Padova, 1907.

mersed; where they grow on rock or woodwork in a station left bare for an hour or two at low tide, the tufts are dense enough to retain moisture until the tide returns; under these conditions the spores are not needed.

Some five years since the writer published a note on *Acrochaete* and *Chantransia*,[1] treating our species according to the classification of Bornet,[2] in which species with sexual fructification are referred to *Chantransia*, those with asexual fructification only to *Acrochaetium*. Since that time considerable attention has been given to this group, and sexual organs have been found in species heretofore supposed to lack them. Kylin[3] and Rosenvinge,[4] whose papers are specially important, include all under *Chantransia*, and it is probable that this treatment will be generally adopted. In conformity with this changes should be made in the names given by the writer in the paper above mentioned, and also in a later note [5] as follows: —

Chantransia Dasyae nov. comb. *Acrochaetium Dasyae* Collins, Rhodora, Vol. VIII, p. 191; P. B.-A., No. 1342.

C. flexuosa (Vickers) nov. comb. *Acrochaetium flexuosum* Vickers, Ann. Sci. Nat., Ser. 9, Bot., Vol. I, p. 60. P. B.-A., No. 1696.

C. Dictyotae nov. comb. *Acrochaetium Dictyotae* Collins, Rhodora, Vol. VIII, p. 193, P. B.-A., No. 1394.

C. minima nov. comb. *Acrochaetium minimum* Collins, Rhodora, Vol. X, p. 133. P. B.-A., No. 1493.

C. Hoytii nov. comb. *Acrochaetium Hoytii* Collins, Rhodora, Vol. X, p. 134. P. B.-A:, No. 1540.

Among the material collected by Dr. Hoyt another species of *Chantransia* occurs, which seems to be identical with a Mediterranean plant long since distributed in Erb. Crit. Ital., under the name of an Atlantic coast species, *Callithamnion Lenormandi* Suhr; though Bornet [6] notes that the two are distinct he does not propose a new name; it may now be called

[1] Collins, Acrochaetium and Chantransia in North America. Rhodora, Vol. VIII, p. 189, 1906.

[2] Bornet, Deux Chantransia corymbifera Thuret. Acrochaetium et Chantransia. Bull. Soc. Bot. de France, Vol. LI, p. XIV, 1904.

[3] Kylin, Zur Kentniss einiger schwedischer Chantransia-Arten. Bot. Studier tillägnade F. R. Kjellman, p. 113, Uppsala, 1906.

Studien uber die Algflora der schwedischen Westküste; Akademische Abhandlung, Upsala, 1907.

[4] Rosenvinge, The marine algae of Denmark, part I, Kgl. Danske Vidensk. Selsk. Skrifter, Ser. 7, Vol. VII, No. I, 1909.

[5] Collins, Two new species of Acrochaetium. Rhodora, Vol X, p. 133, 1908.

[6] Bornet, l. c., p. XIX.

Chantransia Dufourii n. sp. Filamento de cellula basali singula sphaerica, 5–8 μ diam., egrediente, 4–5 μ diam., cellulis 2–5 diam. longis; ramificatione interdum opposita vel alternante, at plerumque secunda; ramis erectis, subdistantibus; sporis 5–6 × 7–10 μ, sessilibus vel pedicello unicellulari affixis, ad filamentum principale vel ramum, plerumque secundatim seriatis.

Filament arising from a single spherical basal cell, 5–8 μ diam.; erect, 4–5 μ diam., cells 2–5 diam. long; branching sometimes opposite or alternate, more commonly secund; branches erect, not very closely set; spores 5–6 × 7–10 μ, sessile or on a one-celled pedicel, on the main filament or on a branch, usually in secund series. On *Sargassum vulgare* Ag., Beaufort, North Carolina, collected by Dr. W. D. Hoyt. Type specimens in the National Herbarium at Washington; cotype material distributed as P. B.-A., No. 1594, under the name of *Acrochaetium Dufourii.*

This minute species is common on fronds of *Sargassum*, usually in company with *Erythrotrichia ceramicola* (Lyng.) Aresch., and often with *Goniotrichum elegans* (Chauv.) Le Jolis. It appears to be the plant of the Mediterranean distributed by Dufour in Erb. Crit. Ital., No. 953, as *Callithamnion Lenormandi,* but not *C. Lenormandi* Suhr in Kützing, Sp. Alg., p. 640.

Ahnfeldtia plicata (Huds.) Fries, forma **furcellata** nov. forma. Ramificatione regulariter dichotoma, frondem subflabellatam efficiente.

Branching regularly dichotomous, giving a flabellate outline to the frond. Black Rock, New Bedford Harbor, Massachusetts, July 25, 1909, *Prof. G. T. Moore.* Type in herb. F. S. C.; cotype material distributed as P. B.-A., No. 1645.

In the typical form of *Ahnfeldtia plicata,* the branching is very irregular, the branches of quite unequal length, so that the tufts have a very ragged appearance; in the present form the branching is as regular as that of *Polyides rotundus* (Gmel.) Grev., which it considerably resembles, although the *Polyides* is usually a considerably stouter plant.

Malden, Massachusetts.

New England Federation of Natural History Societies. — The autumn meeting of the Federation will be held at Lawrence, Massachusetts, Friday and Saturday, September 29 and 30 in connection with the Natural History Societies of Lawrence and Andover.

Circulars giving details of the arrangements for the meeting will be issued about September 1 and will be sent to any address by the Secretary, J. H. Emerton, 194 Clarendon Street, Boston.

Epilobium palustre L., var. **longirameum**, n. var., caule robusto 2–3.8 dm. alto a basi ad apicem ramulis robustis elongatis praedito, ramulis basi decumbentibus valde ascendentibus caulim primarium subaequantibus; foliis amplis lanceolatis vel lanceolato-ovatis primariis 4–8 cm. longis 7–15 mm. latis obscure denticulatis, venis parum conspicuis, apice acutis vel obtusiusculis; floribus numerosis plus minusve confertis ante anthesin erectis, petalis pallide roseis 6–9 mm. longis; capsulis albido-sericeis, pedicello brevi recto ascendente.

Stem stout, 2–3.8 dm. high, with stout elongate branches from base to apex; the branches decumbent at base then erect and strongly ascending, nearly equaling the primary stem: leaves large, lanceolate or lance-ovate, the primary ones 4–8 cm. long, 7–15 mm. broad, obscurely denticulate; the veins not very prominent; the tip acute or obtusish: flowers numerous, rather crowded, erect before anthesis; petals pale rose-color, 6–9 mm. long: capsules white-sericeous; their pedicels short, straight and ascending.— An abundant plant in damp spots back of the gravelly sea-strand north of the Straits of Belle Isle. Characteristic specimens examined from Labrador: Blanc Sablon, July 30 and August 4, 1910, *Fernald & Wiegand*, nos. 3720 and 3726 (type in Gray Herb.). Quebec: Bonne Espérance, July 27, 1882, *J. A. Allen*, no. 53.

In typical *Epilobium palustre*, which is common in Labrador and Newfoundland, the comparatively slender stem is simple or at most sparingly and weakly short-branched, the leaves narrower and entire, the flowers few and smaller, and the fruit on usually elongate pedicels. In some of the material of var. *longirameum* the bulblets which terminate the filiform stolons are much larger than we have seen in other forms of *E. palustre*, being 1–1.5 cm. long.—M. L. Fernald and K. M. Wiegand.

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TERATOLOGY IN TRILLIUM OVATUM PURSH.

WALTER DEANE.

(Plate 92.)

THE many instances of teratology in the genus Trillium that are coming to notice more and more as greater attention is paid to this branch of botanical study, and observers are more on the lookout for these forms, seem to show the marked instability in the genus. I have already noted a number of cases (see RHODORA, x. 21–24 and 214–216, 1908 and xii. 163–166, 1910) from New England and New York, and I take great pleasure in recording a most interesting instance in a species from the far west, *Trillium ovatum* Pursh. According to Mr. Charles V. Piper in his Flora of the State of Washington, comprising volume XI. of the Contributions from the United States National Herbarium and bearing the date 1906, the range of the species is "British Columbia to California and Idaho." The type locality is "'On the rapids of the Columbia River.' Collected by Lewis, April 10, 1806, on which date he was at the foot of the Cascades of the Columbia." The flower is white, turning purplish with age.

It is through the courtesy of Mr. W. T. Putnam of Lake Cushman, Washington, a careful observer and an ardent lover of nature, that I am enabled to write the following description. In a letter dated Lake Cushman, Washington, May 24, 1911, Mr. Putnam writes, "A few days ago I found a specimen of the common Trillium of a most beautiful pink and white, not at all the purplish tinge which comes as the flower ages, which had no less than 18 petals. The flower is at present pressing....The root I have." On June 17 I

received the plant carefully pressed, with the rhizome packed in earth in a small box. The latter I turned over to Mr. Robert Cameron of the Harvard Botanic Garden, who planted it in an appropriate place where its development will be watched with much interest. Mr. Putnam sent with the plant a photograph which he calls "A Vine Maple thicket, the setting in which the Trillium was found." The scene in a truly tropical one. The tree is *Acer circinatum* Pursh.

The abnormality in the Trillium is confined to the petals, stamens and pistil. The leaves are normal, in a single whorl of three, rhombic-ovate, and averaging 14 cm. long and 10 cm. broad. The peduncle is 7.5 cm. long and the sepals are narrowly lanceolate, 3.8 cm., 3.7 cm., 3.7 cm. long, and 8 mm. wide.

The petals reach the extraordinary number of twenty-four. Eighteen are in regular alternating whorls of three, the 1st, 3d and 5th and the 2d, 4th and 6th whorls being superposed upon each other. The six petals in the center of the flower form a partially closed cluster, their crumpled and undeveloped character preventing a complete diagnosis of their exact position and shape. The length of the longest one is 1.8 cm., and they apparently alternate with the others in groups of three each in regular order.

I took careful measurements of the first 18 petals. The same order is preserved throughout, the first figures, in whorls 1, 3 and 5 of 3 petals each, referring to the petals superposed upon each other, and so on. The same is true of whorls 2, 4 and 6, and also of the descriptions of the petals. The following is the table of measurements of the petals:

1st whorl,	3.8 cm.,	3.8 cm.,	3.8 cm.	long.
	2.3 cm.,	2.3 cm.,	2.3 cm.	broad.
2d whorl,	4.2 cm.,	4.2 cm.,	4.2 cm.	long.
	2.7 cm.,	2.7 cm.,	2.7 cm.	broad.
3d whorl,	4.4 cm.,	4.2 cm.,	4.1 cm.	long.
	2.5 cm.,	2.2 cm.,	2.5 cm.	broad.
4th whorl,	3.8 cm.,	3.8 cm.,	3.5 cm.	long.
	2.0 cm.,	2.2 cm.,	2.0 cm.	broad.
5th whorl,	3.6 cm.,	3.4 cm.,	3.0 cm.	long.
	1.8 cm.,	1.5 cm.,	1.7 cm.	broad.
6th whorl,	3.3 cm.,	3.1 cm.,	3.1 cm.	long.
	1.9 cm.,	1.9 cm.,	1.7 cm.	broad.

The shape of the petals are as follows:

1st	whorl,	broadly ovate.
2d	"	" "
3d	"	first two slightly ovate, third oblong.
4th	"	first ovate, second and third obovate.
5th	"	broadly ovate.
6th	"	first ovate, second and third oblong.

All the petals are obtuse. There are no stamens or pistil. An interesting accompaniment to the multiplication of petals is, as before related, in the color, the white turning to pink and white, instead of purple. The general resemblance of the flower to that of our beautiful sweet-scented Water Lily, *Castalia odorata* (Ait.) Woodville & Wood, with its many petals, is well shown in the accompanying illustration kindly drawn by Mr. F. Schuyler Mathews. A form of this Water Lily growing mainly near the coast has petals varying from white and pink to pink-red in color.

Turning to the literature dealing with the multiplication of petals in Trillium I find that Prof. F. M. Andrews says in The Plant World for May, 1906, page 101, concerning some plants found near Bloomington, Indiana, "In *Trillium recurvatum* the number of these leaves [floral leaves or petals] in the flowers without reproductive organs was twenty-three, and in *Trillium sessile* fourteen." A specimen of *T. recurvatum* with twenty floral leaves or petals is figured on page 103.

In the Asa Gray Bulletin for February, 1898, pages 18–20, Mrs. W. A. Kellerman tells a most interesting story of a double *Trillium grandiflorum*. The plant was found in the woods of Jefferson County, Ohio. It had thrived, after being transplanted, for ten years, always producing a double flower, when Mrs. Kellerman secured three flowers from the plant. Two she mounted in diagrammatic form, one showing nine, and the other *thirteen* whorls of petals. The latter is figured on page 20.

The late Prof. William R. Dudley in The Cayuga Flora, 1886, page 99, under *Trillium grandiflorum* Salisb. says, "Double-flowered specimens from Woodwardia Swamp Woods, have about 14 parts to the perianth." Instances might be multiplied, but enough have been given to show that this phase of teratology in Trillium is well known in a number of species, but, so far as I have learned, it has not been previously recorded for the northwestern *Trillium ovatum*.

Cambridge, Massachusetts.

A DIMORPHISM IN TIARELLA CORDIFOLIA.

C. H. DANFORTH.

TEN years ago while botanizing in Norway, Maine, the writer was surprised to find two sorts of anthers in *Tiarella cordifolia.* It was noticed at the time that in all the fresh flowers on some plants the anthers were bright yellow while in others they were all of a decided orange color. The two types were quite distinct in this one particular, but apparently identical in every other.

Since 1901 I have regularly observed both forms at Norway, but no further study of them was made until the present season when I examined the anthers and pollen microscopically. The color of the anthers was then found to be due largely or entirely to the contained pollen. The dry pollen grains are elliptical in outline. Those from the yellow anthers are of a clear yellowish green color, those from the orange anthers have a reddish brown tint. When placed in water or weak alcohol they become shorter and somewhat triangular. In a few moments, especially in the alcohol, small droplets of the coloring matter are forced through the wall and collect on the surface giving the grain a tuberculated appearance. The orange pigment is in relatively greater abundance and is more noticeable than the yellow. It is not dissolved by water or weak alcohol, in which the droplets tend to coalesce, but it does mix freely with ether, chloroform, xylol, and strong alcohol.

The anthers retain their color, at least for a time, in pressed plants but in old herbarium material they are badly faded, due it may be to the poisoning agents that have been used. Recently, however, I have received fresh specimens of both forms from Caribou, Maine, Bridgewater, New Hampshire, and Barre, Vermont, which indicates that the variation is of widespread occurrence. The relative abundance of the two forms has not been determined, but it is a personal impression that they are in the proportion of at least two plants with yellow anthers to one with orange.

No traces of mycelium or other evidences of pathological change could be detected in fresh mounts, and both kinds of pollen readily germinated under artificial conditions producing good tubes. Thus it seems very probable that we here have to do with normal plants

involving a marked and clear-cut variation in a single character. Intermediate shades have not yet been found, nor have both colors been seen on the same plant.

The occurrence of this supposed single-character variation indicates that *Tiarella* may be desirable for breeding experiments. The further fact that the two forms are distinguishable by their pollen (which follows a reduction division in the mother cells) suggests that they may be used in cytological and Mendelian studies.

The experience of Dr. Coville with *Epigaea*[1] suggests that with a little care in regard to a few factors many of the wild plants could easily be brought under cultivation and exceptionally good specimens obtained. Moreover there is a sheet of *Tiarella* in the Gray Herbarium bearing a note dated May 11, '86, addressed to Dr. Gray, and signed by M. A. C. Livermore, in which it is stated that the specimens are from a bed of *Tiarella* which originally came from Wilton, New Hampshire. This indicates that the plant had been successfully cultivated in the garden. So there is good reason to expect *Tiarella* to succeed in experimental cultures.

Tufts College, Massachusetts.

A NEW VARIETY OF RUBUS CANADENSIS.

W. H. Blanchard.

Rubus canadensis L. var. **septemfoliolatus**, n. var. Rubus nigrobaccus fruticosus erectus glaber modice elatus, caule tereti aculeis multis brevibus armato, foliis atrovirentibus latis proximis, foliolo terminali saepe in foliola tria sejuncto, deinde foliis 7-foliolatis.

Turiones novi. Caules 9–12 dm. alti, glabri, subteretes, aculeis multis brevibus validis 2 mm. longis, circa 15 ad unciam, armati. Folia 5-foliolata, magna, glabra, atrovirentia; foliola lata breve acuminata, contigua et incubantia, pari inferiore sessili, pari laterali breve petiolulato, foliolo terminali in petiolulo 2.5 cm. longo, latissimo, cordato, saepe lobato vel partito, aut minus saepe in foliola tria diviso.

Turiones veteres. Inflorescentiae plus minusve cymosae aut interdum breve racemosae in ramulis crassis saepe frondosis 7–12 cm.

[1] Coville, Frederick V. The use of acid soil for raising seedlings of the Mayflower, Epigaea repens. Science, N. S., Vol. XXXIII, No. 853, pp. 711–712.

longis. Fructus subglobosi, laxi, magnitudine mediocres. Plantae haud perfecundae.

A glabrous, moderate-sized bush blackberry with dark green foliage, round stem armed with numerous short prickles, and broad close leaves, the middle leaflet frequently divided into three separate leaflets making them 7-foliolate.

New canes. Stems 3 to 4 feet (9 to 12 dm.) high, glabrous, nearly terete, armed with numerous short strong prickles $\frac{1}{12}$ inch (2 mm.) long, about 15 to an inch of stem. Leaves large, broad, dark green, glabrous; leaflets broad, short-pointed, overlapping, lower pair sessile, side pair on short petiolules, middle leaflet on a petiolule 1 inch (2.5 cm.) long, very broad, cordate, often lobed or parted, frequently divided into three leaflets.

Old canes. Inflorescence irregularly cymose or sometimes short-racemose on stout often leafy fruit-branches 3 to 6 inches (7 to 15 cm.) long. Fruit a somewhat globose loose berry of moderate size. Not very productive.

In Newfoundland. Kane Valley five miles west of St. John's in a brook meadow; Norris Arm along the railroad sparingly for a mile; Grand Falls near the paper mill.

The dark green glabrous foliage of this blackberry and the high latitude in which it grows at once indicate that it is a form of *R. canadensis* L., and it is no more strongly armed than is frequent in the far north. It is a larger plant than is to be expected in such a latitude and such surroundings, and it differs greatly from all other forms of *R. canadensis* north or south in the form of its leaves, which resemble in shape and size those of *R. recurvans* Blanchard, having wide leaflets and short petiolules. The cordate middle leaflet is very noticeable and is more so when it is lobed or parted on one side or on both sides, but it is very striking when it is divided into three leaflets as it frequently is.

The plant is normally 5-foliolate; probably one-fourth of the canes, possibly a much greater proportion have some 7-foliolate leaves. This variation in the middle leaflet occurs, though rarely, in some other species, and is generally considered to be a freak, but here it is so common that it may well be considered as a distinctive character. No constant characters can be discovered in the growth on the old canes, and this is the case generally in the extreme northern range of this species. A cymose form of inflorescence is most often seen, and all kinds of oddities occur, but the typical raceme is not found.

I spent the last ten days of August, 1909, in botanizing in Newfoundland, crossing the island twice, a distance of 1100 miles, and explored

as much as the time at my disposal would allow at four places — Bay of Islands on or near the west coast, St. John's on the extreme east coast, and at Norris Arm and Grand Falls between, and I found this blackberry at all of these places except Bay of Islands. But on July 10, 1910, Professors Fernald and Wiegand found at Goose Pond in the valley of the Humber River, seventy miles east of Bay of Islands what appears to be the same form having large flowers with wide petals, but the new canes were not sufficiently advanced to show the expected division of the broad middle leaflet into three.

Blackberries as I expected were not common and the inhabitants seemed to have never seen them. In two cases where persons were sure no such plants existed, I showed them the plants were close by — in one case a few rods from where a farmer was hoeing and in another close to a woman's house.

WESTMINSTER, VERMONT.

POPULUS VIRGINIANA FOUGER.

IVAR TIDESTROM.

IN Maryland and Virginia there appear to be two distinct forms of black poplar which are at present referred to *Populus deltoides*. These are a form that is usually cultivated as *P. deltoides* Marsh. and *P. virginiana* Fouger. The former is commonly cultivated but up to the present time I have not been able to find any trees in the wild state, although it appears as if some about Newark, Delaware, might be so. At any rate the identity of *Populus deltoides* Marsh. is uncertain. According to Marshall [1] the tree grows naturally in Carolina and Florida, but his description seems to apply to the trees in Delaware. His description appears to have been taken from "Bartram's Catalogue" and he gives due credit to the latter author. The description reads in part as follows: "The leaves are large, generally nearly triangular, toothed or indented with sharp and deep serrations, of a shining full green on their upper surface, but somewhat lighter or hoary underneath; standing upon long slender foot-stalks, and generally restless or in motion."

[1] Arbustum Americanum, p. 106.

Any one who has travelled in Delaware or portions of Maryland, where poplars are usually found planted about farm houses, might readily have observed these majestic trees with large and spreading branches and broad crowns. Perhaps Marshall described a cultivated tree of his own region, but not knowing its origin, and thinking it the same as Bartram's *P. deltoides*, ascribed it to Carolina and Florida.

Schneider [1] cites *Populus marilandica* Poiret [2] as a synonym of *P. deltoides.* The description, however, is not sufficient to identify the species of Poiret, since nothing is said about the leaves on the new growth, which differ both in form and size from those of the branches. In our concept of species, particularly where we deal with the *Salicaceae*, and for that matter with some groups outside of this family, it is absolutely necessary to take account of the new growth.

In Europe where many of our American poplars have been cultivated for more than a century, traditions have aided in the clearing up of the species and their synonymy. Ascherson and Graebner [3] have two forms, "subspecies," under their aggregate (Gesammtart) *Populus canadensis.* The first appears under this name while the second is held to be *Populus virginiana* Fougeroux. They describe the leaves of *P. canadensis* as follows: "Blätter aus kaum herzförmigem, geradem, oder meist kurz keilförmigem Grunde, breit-eiförmig bis fast rhombisch, zugespitzt, am Rande ziemlich regelmässig gesägt, die unteren der Aeste am Grunde vorgezogen, der Vorsprung am Blattstiel meist einen rechten Winkel bildend, an der Einfügung des Stieles meist mit 2 Drüsen, alle am Rande oder anliegend behaart, an kräftigen Treiben bis über 1 dm. lang und breit." I take this description to apply to the tree which we know as *P. deltoides.* As Ascherson and Graebner state, the leaves are very variable, but usually somewhat rounded at the base, serrate with incurved teeth and acuminate. The larger leaves of the root-shoots, uppermost branchlets, etc., are truncate at the base and acute,— thus somewhat "deltoid." The petioles of both forms are usually equal in length to or longer than the leaf-blade. A good illustration of the ordinary leaf-form is given in Bailey's Cyclopedia **5**: 1410, f. 1913, while the larger form is given under f. 1912. *Populus deltoides* is a pyramidal tree when young but when older, and particularly when free to expand, it be-

[1] Illustr. Handb. Laubh. **1**: 7, 1906.
[2] Lam. Enc. Suppl. **4**: 378, 1816.
[3] Syn. Mitteleurop. Flora **4**: 33, 1908.

comes a larger tree with spreading branches. (The same statement might be made with respect to other species of Populus, except *Populus nigra italica* and *P. alba Bolleana* which are naturally fastigiate forms.) I have only seen staminate trees of *P. deltoides* in our region. The aments are well illustrated in Professor Sargent's magnificent work.[1] The anthers are described as being red, which statement agrees with my observations. In or about Washington the trees flowered this year about April 7, two weeks later than in ordinary seasons.

The other "subspecies" of Ascherson and Graebner's treatment, is apparently native of this region. Its entire range is unknown at present. Typical leaves of this species are illustrated by Schneider under *P. monilifera,* from which it may not differ in any particular except possibly in varietal characters. It was only upon the authority of the early botanists that I ventured[2] to identify our native tree with *P. virginiana* Fougeroux. If any species is entitled to this name it is certainly this one, which is the only apparently native black poplar of Virginia. It is readily recognized by its leaves. These are almost always somewhat cordate. (See the text figure.) Not only in the form of the leaves do the two species differ. Their flowering seasons are about two weeks apart in our region. Another feature is that the anthers in *P. virginiana* are yellow, while in *P. deltoides,* as stated above, they are red.

Fig 1. Populus virginiana. Leaf × ½, showing characteristic form of base.

Populus virginiana flowered this year about April 20, just thirteen days after *P. deltoides,* and it was indeed a pleasant sight to see the golden aments. The trees from which I collected my specimens

[1] Silva of N. Am. **9**: 179.
[2] Elysium Marianum **3**: 16, t. 3, f. B, 1910.

(No. 4475) are located near the Glen Echo lock of the Chesapeake and Ohio canal along the Potomac River. They are the very trees upon which the record of *Aigeiros virginiana* in Maryland was based. At the time I re-established this species I had never seen the tree in flower. Since that time my friend, Mr. Bartlett, has observed a number of trees along the Virginia shore of the Potomac River, some ten miles above Washington.

A synopsis of our black poplars and their synonymy may be given as follows:

Leaves of a cordate type.

POPULUS VIRGINIANA Fouger. Mem. Soc. Agr. Par. 1786: 87, 1787.

P. nigra β virginiana Castigl. Viaggio negli Stati Uniti **2**: 334, 1790.

P. monilifera Ait. Hort. Kew. **3**: 406, 1789?

Michx. f. Hist. Arb. **3**: 295, t. 10, f. 2, 1813.

Watson, Dendr. Brit. **2**: t. 102, 1825 (typical leaves).

Schneider, l. c. f. 1: a–c, f. 3; n–n^2.

Aigeiros virginiana Tm. Elys. Mar. **3**: 16, t. 3, f. B. 1910.

Virginian Black Poplar.

Pyramidal (when young), with spreading stout branches and a broad crown (when old): bark ashy-gray with a tinge of yellow; branchlets olive-colored or light-brown; buds light-brown, acuminate, scales ovate with a whitish margin, mucronate; leaves on somewhat reddish petioles, mostly cordate (1 dm. in length and fully as broad) acuminate, glabrous or nearly so on the upper face, sparingly pubescent on the lower face, *margins pubescent,* crenate-serrate from within 2 cm. on each side of the petiole to within the same distance of the apex; staminate aments 1 dm. or less in length, scales laciniate, caducous; flowers on pedicles 5 mm. more or less in length; stamens about 30 in number, anthers yellow; fruiting aments 1 dm. or more in length.

In *P. virginiana* the leaf-margin on each side of the petiole is nearly straight and entire: where it meets the petiole it forms an angle of about 120°, as shown in the illustration.

Castiglioni (l. c.) held the Virginian poplar to be a variety of the black poplar of Europe, possibly on account of the dark green color of the leaves. That he regarded it identical with *Populus virginiana* Fouger. is evident from the following extract:

"Così il Pioppo nero della *Virginia* (*Spec.* I. *var.* β) sembrami una varietà del Pioppo nero d'Europa, benchè il Sig. *Fougeroux de Bondaroy* nelle Memorie della Società d'Agricoltura, che si stampano a Parigi, ne formi una nuova specie. Quest' albero s'innalza a settanta, ed ottanta piedi formando una cima rotonda, le sue foglie sono sostenute da lunghi picciuoli spesso tinti di rosso, e sono quasi a figura di cuore, scannellate al margine, e liscie da ambe le parti . . . ."

Leaves of an ovate type.

POPULUS DELTOIDES Bartr., Marsh. l. c.?

P. canadensis Moench, Weisenst. 81, 1785; Asch. & Graebn. Syn. **4**: 33, 1908.

? *P. marilandica* Bosc; Poir. in Lam. Enc. Suppl. **4**: 375, 1816.

Aigeiros deltoides Tm. l. c.

Similar in stature and form to the preceding: branchlets smooth, yellowish-brown: buds dark olive-brown, pointed; normal leaves 8–10 cm. in length, deltoid-ovate, base rounded; crenate-serrate to within 1 cm. of the apex; leaves of the root-shoots and uppermost branchlets 15 cm., more or less, in length, and as wide, base truncate: staminate aments about 1 dm. in length; stamens about 40, anthers dark red.

It is to be hoped that local botanists will take up the study of their native poplars so that we may know at least as much about our trees as is known in Europe. Concepts based on herbarium specimens alone often tend more to confuse than illuminate.

BUREAU OF PLANT INDUSTRY, Washington, D. C.

ON GYNODIOECISM IN PLANTAGO LANCEOLATA.

HARLEY HARRIS BARTLETT.

IN 1879 Franz Ludwig[1] published an account of the forms of the flower in *Plantago lanceolata*, in connection with a general discussion

[1] F. Ludwig: Ueber die Blütenformen von *Plantago lanceolata* L. und die Erscheinung der Gynodiöcie. Zeitschr. für die gesammten Naturwissenschaften, lii (1879), p. 441. Review in Bot. Centralb. i (1880), p. 331.

of gynodioecism. He called attention to the observation by Darwin [1] that in England there were two kinds of stocks of *Plantago lanceolata*, of which one had perfect and the other pistillate flowers. The flowers of the pistillate stocks did, indeed, bear anthers, but there was either no pollen at all or only a few imperfect grains of varying size. According to a communication from Delpino to Ludwig, there were in Italy three geographic varieties of *P. lanceolata*, of which one only, the early spring form of the meadows, was dimorphous. One form had broad white anthers with an abundance of pollen; the other broad green-yellow anthers with scanty pollen but regular dehiscence, still an hermaphrodite form, but verging toward the gynodioecious condition. In Germany, Ludwig himself found that all the habitat and geographic variations exhibited three flower forms: 1) the ordinary hermaphrodite, with long straight filaments bearing broad, roundish to heart-shaped white anthers containing plentiful pollen, 2) a form with short, crooked filaments bearing slender, green to sulphur-yellow irregularly dehiscent anthers, with abortive pollen, and 3) a purely pistillate form with no filaments and very small rudimentary yellow-green or brownish anthers. He thought that the second of these forms was identical with Darwin's "female form," but the descriptions do not agree well enough to establish their identity beyond question.

With regard to the relative frequency of the forms, Ludwig found that in general the second was much scarcer than the first, and that the third was much more infrequent than the second. He observed that the pistillate form was characterized by extreme fertility, whereas

[1] Darwin's own statement (Forms of Flowers, ed. 2, pp. 306-307) is as follows: "....But I have found in two localities in England female and hermaphrodite forms existing together, and the same fact has been noticed by others. (Mr. C. W. Crocker in 'The Gardener's Chronicle,' 1864, p. 294. Mr. W. Marshall writes to me to the same effect from Ely.) The females are less frequent than the hermaphrodites; their stamens are short, and their anthers, which are of a brighter green while young than those of the other form, dehisce properly, yet contain either no pollen, or a small amount of imperfect grains of variable size. All the flower heads on a plant belong to the same form. It is well known that this species is strongly proterogynous, and I found that the protruding stigmas of both the hermaphrodite and female flowers were penetrated by pollen tubes, whilst their own anthers were immature, and had not escaped out of the bud. *Plantago media* does not present two forms; but it appears from Asa Gray's description ('Manual of the Botany of the N. United States,' 2nd. edit. 1856, p. 269. See also 'American Journal of Science,' Nov. 1862, p. 419, and 'Proc. American Academy of Science,' Oct. 14, 1862, p. 53.) that such is the case with four of the North American species. The corolla does not properly expand in the short-stamened form of these plants."

the common hermaphrodite form often failed to produce seed. Another character which distinguished the intermediate and pistillate forms from the hermaphrodite was that the former produced greatly elongated stigmas far more frequently than the latter. This seemed to be due in part to the continued growth of the stigmas in pistillate plants whose pollination was delayed beyond the time at which a normal hermaphrodite would have been self-pollinated. In part, however, it seemed to be an inherited tendency of the pistillate stocks.

A. Schulz [1] established the fact that *Plantago lanceolata* is not only gynodioecious but also gynomonoecious. The flower spikes of gynomonoecious stocks bear both hermaphrodite and pistillate flowers, and intermediate types, in separate zones or variously intermingled.

The writer's attention was brought to the forms of *Plantago lanceolata* in the summer of 1910 through finding in his experiment garden at Bethesda, Maryland, a single plant with bright yellow sagittate anthers. This plant was unique, for an examination of thousands of specimens of the species in the surrounding fields failed at the time to disclose another like it. However, the search brought to light many purely pistillate plants, which formed no inconsiderable proportion of the total number, and a great variety of gynomonoecious forms. At the time the yellow-anthered form was found, the Plantago had been in flower only a short time. Since then the greater part of the season of 1910 and the season of 1911 have passed without more than a half dozen such specimens having been found. Many times an identical anther form has been found on gynomonoecious stocks which were nearing the close of their season, and flowering only at the top of the spikes. Such plants never failed to show, however, the wilted remnants of broad white anthers like those of the pure hermaphrodite form.

For convenience the three chief forms of *Plantago lanceolata* which have been found about Washington will be called, in the remainder of this paper, the 1st and 2d form hermaphrodites and the pistillate form. They correspond to the three forms distinguished by Ludwig, although their numerical distribution is not the same here as in Germany. (It will be remembered that Ludwig found his intermediate form much more abundant than the pure pistillate.

[1] A. Schulz: Beiträge zur Kenntniss der Bestäubungeinrichtungen und Geschlechtsverteilung bei den Pflanzen. Biblioth. Bot., Heft 10 (1888) p. 90.

Fig. 1. Plantago lanceolata. Flower of 1st form hermaphrodite.

1st Form Hermaphrodite. This is the form shown in fig. 1. Typically the filaments are about four times as long as the stigma. The anthers are white, and twice as long as broad. The pollen is very abundant.

2d Form Hermaphrodite. A flower from the plant found at Bethesda, Md., is shown in fig. 2. The filaments and style are of equal length, and about half as long as the filaments of the 1st form. The anthers are four times as long as broad, and yellow. The pollen is more scanty than in the 1st form, and, on account of the irregular dehiscence of the contabescent anthers, is not usually liberated. Pollen grains of uniform size, diameter half as great as in the 1st form.

Pistillate Form. Shown in fig. 3. Filaments so short that the abortive, brownish anthers are hardly or not at all exserted. Stigma usually longer than in the 2d form hermaphrodites.

Fig. 2. Plantago lanceolata. Flower of 2nd form hermaphrodite.

Pistillate forms vary greatly in the extent to which the stamens are developed. Some of them differ from the 2d form hermaphrodite only in the fact that the anthers are greener, and contain no pollen. In others the stamens are represented only by minute scales. In some pistillate types very few of the flowers ever open. The stigmas are extruded as usual, but the perianth never expands. In others the flowers open in the normal way.

Both the 2d form hermaphrodite and the pistillate form show much variation in the length of the stigma. When the original plant of the 2d form hermaphrodite was found, its stigmas

were exceedingly long and plumose, so that the spikes looked like bearded wheat. This extreme condition was temporary, however, for as soon as the 1st form hermaphrodites in the fields commenced to yield plenty of pollen, the stigmas did not grow so long. Yet the character of long stigmas is by no means altogether circumstantial. It is often seen in pistillate plants which are growing in colonies where pollen is abundantly available. It may likewise be shown to occur rarely in the 1st form hermaphrodite, and more commonly in the gynomonoecious types, by examining the length which the stigmas attain before the lowermost flowers of a spike mature their stamens. On the other hand, pistillate types occur in which the stigmas are very short indeed. The long- or short-stigma character may occur in combination with any set of stamen characters.

All the seed matured by the original plant of the 2d form hermaphrodite found in 1910 were saved and planted. No effort was made to guard pollination. Doubtless the stigmas were pollinated by the 1st form hermaphrodite, for the plumose styles of one spike were examined and found to be amply supplied with the large pollen of the 1st form while the anthers of the 2d form were drying up without having dehisced.

Fig. 3. Plantago lanceolata. Flower of pistillate form.

The seed were planted in four lots:

1st lot. 25 seeds from the first three spikes to mature, planted in August in unsterilized garden soil taken from below the surface. Plants 1 to 9.

2d lot. Seed from the last three spikes to mature. If there were any self-pollinated seed (which is very improbable) they would have been in this lot, for at the time the spikes flowered the mother plant was isolated in the green-house, and there were very few plants in bloom out doors. Planted in October in clean white sand.— 17 plants, nos. 10 to 26.

3d lot. Seed from spikes which flowered in the garden during the

height of the season. Planted in December in sterilized soil.— 45 plants, nos. 27 to 71.

4th lot. Remaining seed from the first three spikes, planted in February in sterilized soil.— 66 plants, nos. 72 to 137.

The first three lots were twice repotted, and were never set out in the garden. The fourth lot were set out in the garden early in the spring. Details of the planting are recorded because some of the plants will be grown another generation, and reported upon next year. The results of growing the first generation are chiefly of interest in that they show how the characters of such a derivative as the 2d form hermaphrodite might maintain themselves in nature, without isolation or selection.

The progeny were readily classified, with a few exceptions which will be discussed later, as typical hermaphrodites of the 1st and 2d forms. The numbers of the two types were as follows:

Lot	1st Form.	2d Form.	Unclassified	Total.
I.	6	2	1	9
II.	7	10	0	17
III.	17	20	8	45
IV.	21	41	4	66
All.	51	73	13	137

None of the plants classified as 1st and 2d form hermaphrodites showed any marked deviation in anther character from the types illustrated in figs. 1 and 2. There were, however, several plants among those called 2d form which had the typical anthers of this form but long filaments, and one plant with unusually green anthers. These will be grown for another generation. The 13 unclassified plants included 7 which formed vigorous rosettes, but did not flower, and 6 with short rounded spikes. The mother plant had long spikes (var. *alopecurodes* F. Ludwig). Short-spiked plants of *Plantago lanceolata* have been set off as a variety (var. *sphaerostachya* DC.) which is not generally maintained as valid, for most systematists would probably regard it, *a priori*, as a mere ecological state. In my cultures, however, a short-spiked variety was sharply set off from a long-spiked variety, although both were grown under identical conditions. The short-spiked plants had some white stamens, but could

not be classed with the 1st form hermaphrodites on account of their strong gynomonoecious tendency.

In vegetative characters the culture showed extreme diversity. One plant was the most narrow-leaved specimen of the species which the writer has thus far seen. Other plants showed almost maximum leaf breadth. (The mother was rather narrow-leaved.) In some of the progeny the leaves were prominently serrate, in others nearly entire. In pubescence, length of stigmas, shape of perianth parts, and development of anthocyanin there was no uniformity. There seemed to be no correlation of these characters with one another, except that perhaps narrow leaves were usually correlated with narrow perianth parts, and that 2d form hermaphrodites were never very broad-leaved. On the other hand, many narrow-leaved plants, including the exceptional one mentioned above, were of the 1st form.

Seed from a purely pistillate plant of *Plantago lanceolata* were also harvested in the fall of 1910 and planted in a cold frame in sterilized soil. Unfortunately there was no room to pot the young plants, so that when they became over-crowded they had to be set out in the garden directly from the seed pans. A late frost destroyed all but a few of four hundred plants. The remainder, in bloom, were either like the mother (purely pistillate) or the usual 1st form hermaphrodite. The numbers of each type were not counted, however. The culture will be repeated next year.

Correns has made a study of heredity in many gynodioecious plants. In those of his papers [1] which deal with *Plantago lanceolata* he has reported on the progeny of 28 plants whose pollination was unguarded, and four plants whose pollination was guarded. All of his mother plants seem to fall into the following categories: 1) pure 1st form hermaphrodites, 2) gynomonoecious types with a) some functional stamens, or b) all of the anthers contabescent, and 3) purely pistillate types. His tabulated results show that the progeny of all except certain of the pure hermaphrodite stocks included pure pistillates, and even in the case of one of the pure hermaphrodites, the pure pistillates amounted to 50%. Since in counting pure pistillate stocks,

[1] Correns: Die Vererbung der Geschlechtsformen bei den gynodiöcischen Pflanzen. Ber. d. deutsch. bot. Ges. xxiv (1906) pp. 459–474.

—— Zur Kenntnis der Geschlechtsformen polygamer Blütenpflanzen und ihrer Beeinflussbarkeit. Jahrb. f. wiss. Bot. xliv (1907) pp. 124–173.

—— Die Rolle der männlichen Keimzellen bei der Geschlechtsbestimmung der gynodiöcischen Pflanzen. Ber. d. deutsch. bot. Ges. xxvi a (1908) pp. 683–701.

Correns excluded all plants with contabescent anthers,[1] it is of interest that the 2d form hermaphrodite, with contabescent anthers only, should (with one possible exception) give no progeny more closely approximating the pistillate form than itself. It is furthermore noteworthy that there should be 2d form hermaphrodites among the progeny with typical anthers but with filaments long and straight, as in the 1st form, and that these should have but one type of flower, (i. e. should show no tendency toward gynomonoecism.)

Neither out-door observations of wild plants nor garden and green-house cultures sustain Ludwig's statement that the pistillate plants of *Plantago lanceolata* flower later in the season than the hermaphrodites. After the height of the flowering season has passed, pistillate stocks seem unusually abundant because the continued growth of the unpollinated stigmas makes them unusually conspicuous. Then too, gynomonoecious types often have only pistillate flowers at the tops of the spikes, and late in the season might be carelessly classified as pure pistillates.

Bureau of Plant Industry, Washington, D. C.

The Range of the Black Birch to be restricted.— In all the manuals of botany and tree books where it is treated we are assured that the black birch, *Betula lenta*, often called the sweet birch and cherry birch, ranges east to Newfoundland. But in fact its eastern limit is close to the eastern boundary of New Hampshire, and a line drawn from Portland, Maine, to Montreal will mark its eastern and northern limit at least in the United States. The only places in Maine where I have seen it are in the Piscataqua valley, and the only specimens I have seen from Maine grew there. Specimens labeled as black birch are found from places farther east but the most cursory examination shows them to be incorrectly named. I have botanized in all of the Maritime Provinces and in Newfoundland, and found as I expected that there was no such tree there.

The provincial botanists having never seen the real black birch think that when they find a yellow birch (*B. lutea* L.) with black bark

[1] "Rein gefüllt blühende Stöcke, bei denen die Staubgefässe in Füllblätter verwandelt sind, sind [als rein weibliche Pflanzen] eingerechnet, solche mit lauter kontabeszenten Antheren jedoch nicht, obwohl sie physiologisch auch rein weiblich sind." Ber. d. d. bot. Ges. xxvi a (1908) p. 691.

they have found a black birch, and lumbermen everywhere from the Adirondacks to New Brunswick are sure that they have two birches which they are loth to believe can be age variations only. With them it is a gray or silver birch when the bark on the trunks can be removed like that on the paper birch, but when the back is furrowed with age it is another kind; and it must be admitted that in this case there is little about the bark of a large log to indicate its relationship with a young tree of the same species. There is no commercial distinction, at least in the north, between the timber of the black and yellow birch, and birch floors are invariably called cherry birch floors but are usually if not always made of yellow birch. In fact the black birch in New England never grows to a size suitable for using in anything except in small dimensions such as chair-stuff, baby-wagon spokes, etc. The black birch is hardly a northern tree and the area covered by it in Vermont and New Hampshire is quite limited. It grows in Western Vermont and is frequent in Burlington; and it is found in the lower valleys of the Connecticut and Merrimack and in southeastern New Hampshire. Its range in the provinces of Quebec and Ontario I do not know, but it is abundant at and about Ottawa. Its range as well as its abundance in Michigan, Wisconsin, Minnesota, and Iowa is unknown. In short the two birches *B. lenta* and *B. lutea* have been so confounded by lumbermen and botanists that no dependence whatever can be placed on any published statement as to either range or frequency of the black birch in the north, northeast or northwest.— W. H. Blanchard, Westminster, Vermont.

Arrhenatherum elatius β tuberosum in America.— In a recent number of Rhodora (vol. 13, p. 9, Jan., 1911) the writer described and figured the subterranean organs of a grass supposed to be *Cinna arundinacea* L. During the past spring a number of specimens of these clustered corms were sent to the Department of Agriculture from various stations on the southern Atlantic coastal plain. The frequency with which these were received suggested some recently introduced species. Mr. Cooper of Decatur, Georgia, who first sent the puzzling underground organs was asked to send flowering specimens. This he kindly did, and the plant is found to be *Arrhenatherum elatius β tuberosum* (Gilib.) Halac. (*Avena tuberosa*

Gilib., 1791; *Avena bulbosa* Willd., 1799; *Holcus bulbosus* Schrad.; *Arrhenatherum bulbosum* Presl; *Avena elatior* var. *tuberosa* Aschers.) This common European species appears to be a recent immigrant. There is no record of its appearance in this country earlier than October, 1910, when the first specimen was received from Mr. Cooper. As yet the only specimens received from the Manual region are from King George, Caroline and Chesterfield counties, Virginia. The variety differs from *Arrhenatherum elatius* chiefly in production of clusters of moniliform corms. The spikelets are similar to those of the species but the hairs at the base of the florets are shorter and the second floret is awned. In the species the second floret is usually awnless but sometimes bears a short awn.

Cinna arundinacea has not been found with the clusters of moniliform corms. Late fall specimens show a single basal internode thickened and corm like, as in *Phleum pratense* but much more developed.— Agnes Chase.

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F. Schuyler Mathews del.

TERATOLOGICAL SPECIMEN OF TRILLIUM OVATUM PURSH.

Rhodora

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SYSTEMATIC STUDIES ON OENOTHERA,— I. OENOTHERA TRACYI, SP. NOV.

Harley Harris Bartlett.

(Plate 93.)

An adequate systematic treatment of Onagra, the subgenus of Oenothera typified by *Oenothera biennis*, is greatly needed by students of heredity, who have been led by the work of de Vries to choose material for investigation from this complex and little understood group. On account of the fact that the species can not be correctly interpreted without studying living plants, it is not likely that such a treatment will be soon available. Miss Vail, however, has made a beginning in the careful definition of wild forms tested for constancy by cultivation under controlled conditions. The writer is carrying on a series of cultures at Bethesda, Md., for the purpose of continuing this line of work, and will publish the results as fast as practicable in order to make them available to other students. It is hoped that the work may culminate in a much needed revision.

The desirability of determining the geographic ranges of the allies of *Oenothera biennis* should commend these plants to the attention of collectors. Specimens of the evening-primroses are at best far less satisfactory than most herbarium material, and should therefore be prepared with especial care. They should show all parts of the plant, even if several sheets are required to represent one individual. It is especially desirable to obtain seeds, so that rosettes, or even a second generation of mature plants, may be grown if needed. Our public herbaria do not contain a tithe of the material which a student of the evening-primroses would wish to see before attempting a revision, and many of the available specimens are very poor in quality.

The name *Oenothera Tracyi* is proposed for a southern plant which has appeared in cultures of *Oe. grandiflora* from wild seed collected in 1907 by Prof. S. M. Tracy at Dixie Landing, near Tensaw, Alabama. Several plants grew from the wild seed in the garden at Bethesda, Md., in 1910, from one of which a second generation is now under observation. An identical strain also originated from part of the same lot of seed grown by Dr. B. M. Davis at the Harvard Botanic Garden in 1910, from which a second generation has been grown from self-pollinated seed both at Bethesda and Cambridge in 1911.

Type specimens of the species will be prepared from an individual of the latter strain growing at Bethesda under the collection number 2749. The seed was received from Dr. Davis under the designation "strain S." Photographs by Dr. Davis, from which the illustrations accompanying this article have been prepared, represent plants of the same strain, grown at Cambridge. A description of *Oe. Tracyi* is presented at this time at the request of Dr. Davis, who is preparing a report upon the behavior of certain of its hybrids with *Oe. grandiflora.* The species is named for Prof. S. M. Tracy, to whom students of the evening-primroses are so greatly indebted for the rediscovery of Bartram's locality for *Oe. grandiflora.*

Oenothera Tracyi, sp. nov. Annua. Rosula cito evanescens, paucifolia, foliis spatulatis vel oblanceolatis, maximis ca. 9 cm. longis, 2.5 cm. latis, rubromaculatis, apice obtusiusculis, margine sinuatis. Planta matura 1.5–2.0 m. alta, deorsum ramos cauli primario fere aequilongos, sursum usque ad inflorescentiae basin ramos brevis rosulatos ferens. Caules viridis vel roseo-tincti, pilis aliis sparsis patentibus basi rubrotuberculatis aliis densis minutissimis crispis albis vestiti. Folia approximata vix sessilia, remote denticulata, atroviridia, utrinque molliter pubescentia, apice basique acuta, inferiora oblanceolata, ca. 17.5 cm. longa, 3.7 cm. lata, superiora lanceolata. Inflorescentia ex spicis pluribus densis composita, ramulis rubris. Bracteae infimae textura formaque foliis superioribus simillimae, prope basin latissimae, apicem versus angustatae, supremae angustae fere subulatae, omnes divergentes ciliatae, semper ovario longiores, plerumque fructu breviores. Flores suaveolentes. Hypanthium pallido-viride ca. 34 mm. longum, pilis aliis sparsis curvatis vel subappressis acutis, aliis brevioribus numerosis erectis apice rotundis viscidulis tectum. Calycis segmenta nondum explicata gemmam conicam diametro ad basin 4.5 mm. sub apice 4.0 mm. formantia, 15–22 mm. longa hypanthio sparsius puberula, apicibus liberis 2–3 mm. longis terminalibus inter se appressis, dense pilis acutis crispis pubescentibus. Corolla petalis prima vespera flavis,

altero die, marcescentibus, pallidis, basi carneis, 20–25 mm. longis, 17–23 mm. latis, obcordatis. Stamina petalis paulum breviora valde declinata. Pistillum antheras attingens, stigmatibus 4–6 mm. longis patentibus. Ovarium 8 mm. longum pilis acutis curvatis plerisque non rubrotuberculatis tectum. Fructus maturus 20–28 mm. longus infra mediam 5 mm. crassus, ad apicem versus angustatus, pilis aliis sparsis eis ovarii immaturi similibus, aliis densis minutissimis crispis acutis; apicibus valvulorum liberis brevibus truncatis.— Dixie Landing, near Tensaw, Alabama, seed collected by S. M. Tracy.

BUREAU OF PLANT INDUSTRY, Washington, D. C.

EXPLANATION OF PLATE 93.

Fig. 1. *Oenothera Tracyi.* Mature rosette, a transitory stage, the main stem beginning its upward growth almost immediately. (Culture of B. M. Davis 11.15).

Fig. 2. *Oenothera Tracyi.* Mature plant, showing branches 1.5–2.0 m. long from the base of the stem. (Culture of B. M. Davis 10.22.)

Fig. 3. *Oenothera Tracyi.* Inflorescence, showing the numerous crowded lateral spikes. At the right is a leaf from the lower portion of the main stem. (Culture of B. M. Davis 10.22.)

LYCOPODIUM COMPLANATUM NEAR HARTLAND, VERMONT.

W. H. BLANCHARD.

MR. HAROLD G. RUGG of Hanover, New Hampshire, has sent me some specimens of *Lycopodium complanatum* L. which seem to match exactly those which I collected in Caribou, Maine, Oct. 3, 1909, and described in the July number of RHODORA. Mr. Rugg gives an interesting account of the discovery of the station which is in the nearby town of Hartland, Vermont. His letter was written August 16, 1911.

"The *Lycopodium complanatum* was growing in mossy ground near the edge of some woods, somewhat shady, in the Lull Brook valley, near Hartland village. In May, 1910, five or six of the members of the Hartland Nature Club were on a bird and plant walk. One of the members asked what Lycopodium we were passing, and I at once recognized it as *L. complanatum* and took a specimen (the fruit had

persisted through the winter). No one else gathered any and the station was not visited by any one until I took Mr. Jay G. Underwood there this last June and collected a lot of material. The plant grows at least four miles from the male fern station which is found in the highlands of the town."

The strobiles are full-grown, the running stems evidently did not lie on the surface of the ground, and the annual growths of the forkings are very plainly marked. The Hartland and Caribou plants are well matched by many specimens in the Gray Herbarium, and I surmise will prove to be typical of the form of the species in its southern range, but the cover there containing the specimens of *L. complanatum* in fact holds in addition to these a variety of diverse forms which make it evident that much collecting is needed. It is plainly a polymorphous species as at present known, but whether its forms are distinct and wide-spread, or are intergrading and local, we have no means of knowing at present. The untiring fern hunters can here find a promising field for investigation.

The interesting finds in the neighborhood of Hartland lead one to wonder whether that section has a really rare flora, or are these simply the outcome of an active nature club which may be equalled in many places if a similar effort were made?

Westminster, Vermont.

Dracocephalum thymiflorum a casual Plant at Westford, Massachusetts.— Late in June, 1911, I visited a wool-waste dump on one of the farms in Westford, Mass. Among the weeds found there was a mint, identified for me at the Gray Herbarium, as follows: "*Dracocephalum thymiflorum* L., a native of northeastern Europe and Siberia and according to recent floras becoming introduced in central Europe. We have no American specimens of this species, nor do we find any record of its occurrence in the United States." — Emily F. Fletcher, Westford, Massachusetts.

HARSHBERGER'S PHYTOGEOGRAPHIC SURVEY OF NORTH AMERICA.

M. L. Fernald.

When it was announced that a great series of monographs upon geographic botany was to be issued under the editorship of Engler and Drude botanists felt that, with so distinguished a taxonomist as Engler and so experienced a phytogeographer as Drude standing as sponsors, a series of authoritative works might be expected which would be not merely encyclopedias of accurate information but valuable treatises upon plant distribution. Several volumes already issued are apparently satisfactory fulfilments of this hope; and now comes the volume upon the flora of North America by Professor Harshberger.[1] In appearance the work is like others of the series, a sumptuous book with excellent paper and type and numerous illustrations, filling in all 790 pages besides 12 pages of the ordinary introductory matter and a 50 page "German Extract" by Drude. The main portion of the volume consists of four parts: "History and Literature of the Botanic Works and Explorations of the North American Continent"; "Geographic, Climatic and Floristic Survey," "Geologic Evolution, Theoretic Considerations and Statistics of the Distribution of North American Plants"; "North American Phytogeographic Regions, Formations, Associations."

That the author approached his task seriously and felt himself called to it is shown by the remarks in his preface where he states, that he, "at the suggestion of the editors of 'Die Vegetation der Erde,' undertook ten years ago to write a sketch of the Vegetation of North America, and this volume is the outcome of the study of American vegetation, begun over twenty years ago." This study has resulted, we are told, in a "work which the author has spared no pains to make as accurate, as the existing state of information and the unfortunate confusion in nomenclature would permit." In other words, the book represents the most accurate work which the author is capable of producing. Whether it is of the grade of work which American botanists should demand or by which we wish our European contemporaries to judge us can be seen only by an examination of some portions in detail; and since the author states that "no one region

[1] Engler and Drude: Die Vegetation der Erde, xiii. Phytogeographic Survey of North America. A Consideration of the Phytogeography of the North American Continent, including Mexico, Central America and the West Indies, together with the Evolution of North American Plant Distribution by John W. Harshberger, A. B., B. S., Ph.D. Leipzig (Wilhelm Engelmann), 1911. Large 8vo. pp. lxiii + 790, 1 map, 18 plates, 32 figs. Price unbound, 52 marks (Subscription price 40 M.); bound, 53.50 M. (Subscription price 41.50 M.).

in North America has been more carefully studied botanically than New England" the reviewer may appropriately confine his judgment of the book largely to this and the adjacent regions which, in view of the availability of information, should be among the most accurately described areas discussed in the book.

The first part contains chapters on History and Bibliography. Many familiar names appear in this portion which, although it is by no means complete, will give some impression of the amount of work done by others, and may possibly be suggestive to those who wish to carry the subject to something like completeness. But it is singular that there should be enumerated among the most important students of the New England flora Charles E. Hamlin (a geologist whose name wandered into certain botanical papers because of his geological and physiographic work upon Mt. Katahdin) and some others who at most have published only one or two very minor notes; while no mention either in the historical sketch or the bibliography is made of such critical and scholarly students of the New England flora as Bicknell, F. S. Collins, Dame, Davenport, A. A. Eaton, E. H. Eames, Evans, C. B. Graves, Isaac Holden, Harger, Nichols, Thaxter, Webster and Wiegand. All such omissions are probably meant to be covered by the statement that owing to the number of workers and papers "it is incumbent on the writer to refer to only the most important." But by what judgment, we may ask, is it decided that the botanical works of Charles E. Hamlin (the geologist) and some who are enumerated as important students of the flora of the White Mountains are of more importance as botanical contributions than Bicknell's critical studies of the flora of Nantucket, F. S. Collins's authoritative publications on the Algae and his capital accounts of Cape Cod, Clinton's *Ustilagineae of Connecticut*, Dame & Collins's *Middlesex Flora*, Dame & Brooks's trustworthy *Handbook of the Trees of New England*, Evans & Nichols's *Bryophytes of Connecticut* and their many critical discussions of New England Bryophytes, or the Connecticut Botanical Society's exemplary *Catalogue of the Flowering Plants and Ferns of Connecticut* by Graves, Eames, Bissell, Harger and others? Had the author been more familiar with the painstaking work of these energetic students and had he realized the need of emulating their accuracy and critical judgment the unfortunate volume which is now before us might never have been written.

There is no branch of the botanical field which so much as phytogeographic work demands thorough training in exact taxonomic detail accompanied by the most discriminating judgment and prolonged and painstaking field-study. That the author of the *Phytogeographic Survey of North America* has satisfactorily met these requirements must be doubted by many close students of our flora. Only a brief perusal of the book shows that for the most part it is composed of extracts

from or summaries of papers and notes selected undiscriminatingly from many authors — good, bad, and very bad — and that too often the identifications for which the author acknowledges responsibility are hopelessly wrong. It is also obvious, as one glances over the delimitations of areas and the lists of "typic" (the author studiously avoids the normal *al* ending of adjectives) plants, that we here have a book written without a full appreciation of the axiomatic truth that a work on phytogeography should be based on a clear understanding of identities and of the geographic ranges of plants.

The extracts which have been taken literally from our best observers are of course good as extracts; but the uncritical character of the author's judgment of what he has found printed and his inadequate grasp of the subject with which he has attempted to deal are clearly shown by the following passages copied from almost consecutive pages of the book, with the reviewer's comments bracketed.

[p. 354] "*Strand Formation*. . . .The strand flora of Newfoundland consists of Plantago maritima, Ligusticum scot[h]icum,. . . .while the waves roll in tangled masses of Vallisneria spiralis."

[There are many peculiar features about the Newfoundland flora but even there, just as on our mainland coast, the Eelgrass of the sea-margin is *Zostera marina*. *Vallisneria*, it seems superfluous to state, is a plant of fresh water and is unknown in Newfoundland as the author himself implies when he states elsewhere (p. 316) that it occurs only south of latitude 48°. The original author (John Bell) from whom Harshberger has apparently copied the statement about *Vallisneria* (as well as several other errors) was describing the head of Bay St. George in latitude 48°, 30′. A safer man to copy would have been Bachelot de la Pylaie, who in describing Bay St. George wrote: "Le zostera forme dans les anses des prairies sousmarines, à quelques décimètres au-dessous du niveau des basses eaux des marées de lune; ses longues feuilles graminiformes flottent alors couchées à la surface de la mer." (la Pylaie, *Voyage à l'Ile de Terre-Neuve,* 70).].—

[p. 354] "*Coniferous Forest Formation of Newfoundland*. . . .the higher ground inland may bei [be] covered with bushes of *Juniperus communis, Taxus canadensis, Lyonia* (*Chamaedaphne*) *calyculata* (Juniperus-Taxus Association)."

[Certainly not a very cordial "Association"! For in Newfoundland the only representative of *Juniperus communis* is the var. *montana*, growing ordinarily on the dry rocky or sandy areas or on bleak mountain ledges; *Taxus canadensis* there, as elsewhere, is a shrub chiefly of deep rich woodlands and by the distinguished Newfoundland geologist, the late Alexander Murray, was considered an indicator of the best land on the island; and *Chamaedaphne* is a typical shrub of wet bogs and flooded pond-margins. In other words, this "Juniperus-Taxus Association" of "the higher ground" is largely imaginary and is made up of plants which rarely if ever associate.]

[p. 354] "Remarkable herbaceous plants of the forest [in Newfound-

land] are. . . .Trillium recurvatum,. . . .Goodyera (Peramium) pubescens, Smilacina (Vagnera) stellata,. . . .Secondary woody species:. . . . Viburnum lentago, V. acerifolium."

"In drier woods Mitchella repens, Epigaea repens occur. The edge of the forest along rocky hills is fringed with Juniperus virginiana var. humilis."

[These plants would indeed be remarkable in such habitats in Newfoundland. *Trillium recurvatum* is unknown east of Ohio and Tennessee (see Britton, *Man.*; Small, *Flora*; Gray's *Man.* ed. 7). *Goodyera pubescens* is unknown east of central Maine (see Rhodora, i. 5), the Newfoundland plant formerly reported under that name being *G. tesselata*. *Smilacina stellata* in Newfoundland, as in Labrador and eastern Canada, is a species of the sea-strand or of other gravelly or sandy shores or of light alluvium in intervales; *Viburnum Lentago* and *V. acerifolium* are unknown from east of western New Brunswick (see Macoun, *Cat. Can. Pl.*; Sargent, *Silva*; Britton, *Man.*; Hough, *Handb. of Trees*; etc.). Professor Harshberger has doubtless confused them (as did Dr. John Bell who reported them from Newfoundland before him) with the common *V. cassinoides* and *V. pauciflorum*. *Mitchella repens*, too, is apparently unknown from Newfoundland (see Macoun, *Cat.*; Britton, *Man.*; etc.). though it was once reported by a careless writer who did not realize that *Mitchella* is really quite different from the "Partridge Berry" of Newfoundland. In both Newfoundland and Labrador "Partridge Berry" is *Vaccinium Vitis-Idaea*, var. *minus* (see Waghorne, Proc. & Trans. N. S. Inst. Sci. ix. 383; etc.). In Newfoundland as in eastern Quebec *Epigaea repens* is a plant of the bogs and wet woods — not the "drier woods" (see Rhodora, xiii. 97); and no form of *Juniperus virginiana* is known from east of the Kennebec valley in Maine. The author may have had in mind the common *J. horizontalis*, which he speaks of in other parts of his book, sometimes as *J. Sabina*, sometimes as *J. Sabina*, var. *procumbens*, apparently unaware that so far as North America is concerned these names (used at different times and by various authors) all apply to one and the same shrub.]

[p. 354] "*Sea Cliff Formation.* The sea coast of Newfoundland presents an irregular line of cliffs, beaches and headlands on which are *Alnus viridis* (= *A. alnobetula*), *Viburnum pauciflorum*, *Cornus stolonifera*, *Ribes prostratum*, *Empetrum nigrum*, various species of *Rubus* and *Vaccinium*."

[The "*Alnus viridis*" of Newfoundland is *A. mollis* Fernald (see Rhodora, vi. 162; Britton. *Man.* ed. 2, 1062; Gray, *Man.* ed. 7). Neither this nor *Viburnum pauciflorum*, *Cornus stolonifera*, any *Rubus* or *Vaccinium* are, in western Newfoundland (the only section personally familiar to the reviewer) characteristic of *sea cliffs*. A very slight experience there is sufficient to show that there are plants really growing in the crevices of sea cliffs: such as *Puccinellia* spp., *Cerastium* spp., *Draba* spp., *Cochlearia officinalis*, *Sedum roseum*, *Saxifraga caespitosa*, *Oxytropis campestris*, var. *caerulea*, *Ligusticum scothicum*, *Statice* (*Armeria*) sp., *Primula farinosa*, var. *macropoda*, and *Plantago decipiens*.]

[p. 361] "a) **New Brunswick Area.**"

"This area territorially covers Nova Scotia, New Brunswick and that portion of Quebec south of the subarctic forest.....It comprises the Laurentian highlands south of 50° N. L. The northern portions of Maine, New Hampshire and Vermont (including their mountain ranges) are part of this area, its southern boundary being determined by the southern limit of *Pinus Banksiana* (= *P. divaricata*), *Picea alba* (= *P. canadensis*), as well, as the northern limit of the tulip poplar, *Liriodendron tulipifera*."

[This delimitation is certainly a very remarkable one, since the southern limit of *Pinus Banksiana* is indicated by a line running from the east side of Penobscot Bay to the Rangeley Lakes, thence, with a slight dip southward at the western edge of the White Mountains, across northern Vermont (see Sargent, *Silva*; Dame & Brooks, *Handb. Trees N. E.*; Hough, *Handb. Trees.*; etc.); the southern limit of *Picea canadensis* extends from Casco Bay to northernmost New Hampshire and northeastern Vermont (see Sargent, Dame & Brooks, Hough, etc.); but the northern limit of *Liriodendron* is marked by a line running from the southeastern corner of Worcester County, Massachusetts (see R. M. Harper, RHODORA, ii. 122) to the southwestern corner of Vermont (see Brainerd, Jones & Eggleston, *Fl. Vt.*; also Sargent, Dame & Brooks, Hough, etc.). Thus, if the southern limits of *Pinus Banksiana* and *Picea canadensis* are taken as the southern boundary of the New Brunswick area, most of the White Mountain region is excluded; if, on the other hand, the northern limit of *Liriodendron* is the boundary, then eastern and central Massachusetts and essentially all of Vermont with their forests of *Quercus alba* and *velutina*, *Castanea*, *Carya*, *Juglans*, etc., become a part of the New Brunswick area.]

[p. 366] "*Dry barrens* [of the New Brunswick Area]. The dry barrens, or Moor-Formation are characteristically treeless, but are surrounded by pine [spruce?] forests and on such areas grow lichens, mosses and ericaceous bushes, forming a heather. Here grow *Ledum latifolium*, *Vaccinium macrocarpon*, *Andromeda polifolia*, *Kalmia glauca*, *Betula pumila*, *Lonicera oblongifolia* with *Eriophorum vaginatum*, *Carex oligosperma* and Orchids, *Medeola*, *Linnaea*, *Mitella nuda*."

"The great valley of the St. John River and its tributaries has a flora far more southerly in character than that of northern New Brunswick."

[The author of the *Phytogeographic Survey* has certainly had some unique experiences, for no botanist who has spent years exploring northern New England and eastern Canada would expect to find the woodland *Mitella nuda* in a Cranberry (*Vaccinium macrocarpon*) bog; and he would certainly be astonished if he went to pick Cranberries and found the heath-bog inhabited by *Medeola* of the rich woods. Incidentally it is difficult to think of any habitat in the "New Brunswick Area" (except in alpine and subalpine regions) where one can collect *Ledum latifolium*, *Andromeda glaucophylla* (*A. polifolia* of Harshberger), *Kalmia glauca*, *Betula pumila*, *Lonicera oblongifolia* and

Carex oligosperma without getting his feet wet. Such "dry barrens" as the author seems to have in mind are *dry*, in the ordinary sense, only during periods of drouth.

The prosperous people of "the Aroostook" who are making their fortunes out of the soil (see RHODORA, xii. 111, 115) would be amazed to know that their region ("the great valley of the St. John River and its tributaries") is a "dry barren." However, Harshberger is right in stating that the region has a more southerly flora than some other places, but surely not than "northern New Brunswick," for two of the most important tributaries of the St. John — the Madawaska and the St. Francis — rise *north* of northern New Brunswick. The list of "more southerly" plants given (p. 366) to illustrate this point contains, furthermore, such unfortunate examples as *Aspidium aculeatum*, var. *Braunii* (*Polystichum Braunii*) which is unknown in New England south of the hills of western Maine, the White Mountains, and Mt. Greylock; *Thalictrum dioicum* and *Anemone virginiana*, which reach their northeastern limits in the lower Penobscot Valley, 100 miles southwest of the St. John (see RHODORA, i. 50, ii. 232; Gray, *Man.* ed. 7); and *Vaccinium caespitosum*, which occurs on the mountains of Labrador and northern New England, but is quite unknown south of the northern New England states. Had the author listed *Cyperus esculentus*, *Waldsteinia fragarioides*, *Panax quinquefolium*, *Sanicula gregaria*, *Fraxinus pennsylvanica*, *Scrophularia leporella*, *Phryma Leptostachya*, *Triosteum aurantiacum* and *Lobelia siphilitica*, his illustrations would have been convincing.]

[p. 366] "Several plants are peculiar to this river [the St. John]: Oxytropis (Aragallus) campestris, Astragalus alpinus, Hedysarum boreale, Tanacetum huronense."

[This statement represents the condition of our knowledge in 1861 and indicates that the author who today perpetuates it has ignored or never known of the perfectly authenticated occurrence of one or more of these plants along other valleys of the New Brunswick Area — for instance, the St. Lawrence, Bonaventure, Donglastown, Grand and Grand Cascapedia in Quebec; the Eel, Nepisiguit, Petitcodiac and Restigouche in New Brunswick; the Kennebec in Maine; and the Connecticut in New Hampshire and Vermont. Real illustrations of plants confined to the St. John valley would have been *Kobresia elachycarpa* (see RHODORA, v. 251; Britton, *Man.* ed. 2; Gray, *Man.* ed. 7), *Pedicularis Furbishiae* (see Gray, *Syn. Fl.* & *Man.* ed. 7; Macoun, *Cat.*; etc.) and *Prenanthes mainensis* (see Gray, *Syn. Fl.* and *Man.* ed. 7).]

[p. 366] "The rare plants of the New Brunswick phytogeographic area are Dryopteris (Aspidium) fragrans, Woodsia glabella, Woodsia hyperborea, Oenothera (Onagra) Oakesiana, Hieracium praealtum, Goodyera pubescens, Tanacetum huronense, Viola primulaefolia."

[Just why this meagre list should be selected it is difficult to see unless perhaps the author was compiling from such papers as he happened upon without getting any real insight into his subject. But in passing it may be noted that *Oenothera Oakesiana* is unknown east of Massachusetts (see Vail

in Macdougal, Vail and Shull, *Mutations, Variations and Relationships of Oenotheras*, 70; Gray, *Man.* ed. 7); *Goodyera pubescens* is unknown east of central Maine (see RHODORA, i. 5); and the plants which in New Brunswick have passed, by error of determination, as the "King Devil Weed," *Hieracium praealtum*, are *H. florentinum*, *H. pratense*, and *H. floribundum*, all European weeds recently introduced into our flora and now unfortunately too common (rather than *rare*) in the regions they infest. Rarity in a plant is purely relative, but to those who have explored the regions of Bic and of the Gaspé Peninsula in Quebec (small portions of the "New Brunswick Area") it will be a surprise to learn that *Dryopteris fragrans* and *Woodsia hyperborea* are "rare." But this term might without question be applied to some scores of species which Harshberger does not mention in his list of rare plants of the area: such species as *Cystopteris montana*, *Phegopteris Robertiana*, *Woodsia scopulina*, *Calamagrostis purpurascens*, *Carex lagopina*, *Sagina occidentalis*, *Arabis Holboellii*, *Draba aurea*, *Dracocephalum parviflorum*, *Physalis grandiflora*, and *Arnica gaspensis*, species which as yet are known from only one or two stations in the New Brunswick Area.]

[p. 376]

[In the list of Alpine plants of New Hampshire *Dryas integrifolia* Vahl appears just as if it had full claim to the title, although it was shown in 1903 that its record as a New Hampshire plant was a mistake (see RHODORA, v. 281). And surely Professor Harshberger can find no European support for his assertion that *D. integrifolia* grows in Europe or that *Betula glandulosa* is European — unless "Europe" is stretched to cover Greenland, Kamtschatka and the Altai Mountains.]

[p. 378] "**b) New England Area.**"

"The flora of this area is characterized by the absence of *Picea alba*, *Pinus Banksiana* and by the presence of *Pinus s[S]trobus* and other trees found in the New Brunswick area, but its chief characterization depends on the presence of such trees as *Quercus alba*, *Q. prinoides*, *Q. coccinea*, *Juniperus virginiana* and *Castanea dentata*."

[This definition is practically as ineffective as that of the New Brunswick Area; for, since the author begins his first two subdivisions (Sea Islands and Sea Coasts) with Mt. Desert Island and eastern Maine, it is difficult to reconcile the discussion with the definition. Surely *Picea canadensis* (*alba*) is abundant on Mt. Desert Island and follows the coast to Casco Bay (see Rand & Redfield, *Fl. Mt. Desert*, Sargent, Dame & Brooks, etc.), and *Pinus Banksiana*, though not common on Mt. Desert, is abundant on the adjacent mainland (see Rand, RHODORA, i. 135; Sargent, Dame & Brooks, etc.). But singularly enough none of the trees which *characterize* the New England area as defined are found on Mt. Desert and the adjacent coast (See Rand & Redfield; also A. H. Graves, RHODORA, xii. 173). In fact, the northeastern limit of *Quercus alba* is in south-central Maine (see Sargent, Dame & Brooks, etc.), the most northerly station being at or near Waterville; *Quercus prinoides* (never a *tree* in New England) is unknown in Maine, its northeastern limit being in the region of Manchester, New Hampshire; *Quercus coccinea* is

unknown east of the lower Androscoggin (see Sargent, Dame & Brooks, etc.); *Juniperus virginiana* is of very doubtful occurrence east of the Kennebec valley (see Dame & Brooks); and *Castanea dentata* is known in Maine only in the southern corner (see Sargent, Dame & Brooks, etc.). Therefore a large part of the region described by Harshberger as belonging to the New England Area is by the definition excluded from it!]

[p. 379] "Thickets of *Alnus maritima* also occur according to Harshberger's observations" [on Peaks Island, Portland Harbor].

[It is fortunate that the authority for this remarkable observation is stated. The many discriminating New England botanists who have been on Peaks Island have never seen *Alnus maritima* there. In fact, the reviewer inclines to the belief that Professor Harshberger must have mistaken something else for *A. maritima*, for that unique species is not recognized by other students of the trees from any region of our eastern states outside of Delaware and Maryland (see Sargent, Hough, Britton, etc.)]

[p. 385] "*Bog Formation.* This formation is characterized by the abundance of *Sphagnum* species which form a dense growth over the surface....They may be called islands of northern plants with many ericaceous species. The plants of this formation in eastern Massachusetts are:

Calla palustris L.
Clintonia borealis Raf.
Habenaria lacera R. Br.
Pogonia ophioglossoides Ker.

Calopogon pulchellus R. Br. (= Limodorum tuberosum L. [i. e of Authors, not L.]).
:
:

Sarracenia purpurea L.
:
Utricularia cornuta Michx.
Epilobium lineare Muhl. (=E. densum Raf.).
Vaccinium macrocarpon Ait.
" o[O]xycoccus L.
:
Andromeda polifolia L.
:
Rhododendron Rhodora Don.
:

[Just why *Habenaria lacera* (which rarely grows in *Sphagnum* bogs in Massachusetts) and *Epilobium densum*, with a range from Alabama to southern Newfoundland, *Pogonia ophioglossoides* and *Utricularia cornuta*, ranging from Florida to Newfoundland, and *Sarracenia purpurea*, which extends from Florida to southern Labrador, should be considered peculiarly *northern* it is difficult to make out. And surely the author must have seen some other plant than *Clintonia borealis*, for in eastern Massachusetts *Clintonia* occurs in cool rich woods (see J. Robinson, *Fl. Essex Co.*; Knowlton, Cushman, Deane and Harrison, Rhodora, x. 130).

It is unfortunate longer to inform our unsuspecting European friends that *Andromeda polifolia* grows in Massachusetts bogs. The plant of New England is *A. glaucophylla* Link (see Rhodora, v. 67–71; Gray, *Man.* ed. 7).]

[p. 385] "The cold sphagnum bogs of Vermont have....these

typic bog plants." [Then follows a list including] "Calypso borealis Salisb (= C. bulbosa L. [i. e. (L.) Oakes]);....Orchis rotundifolia Pursh,....Eleocharis pauciflorus Link."

[These plants, however, behave in Vermont, apparently, as they do in Maine, New Brunswick and Quebec, where they are not in *Sphagnum*. Wherever the present reviewer has seen *Calypso* it has grown in a rich carpet of some *Hypnum* or other moss, not *Sphagnum*, and generally on decayed logs or stumps of *Thuja*; *Orchis rotundifolia* is also typical of Arbor Vitae swamps where it grows in wet hollows among true mosses and liverworts; and *Scirpus pauciflorus* (*Eleocharis pauciflora*) is found in wet but hardly sphagnous shores or banks or on dripping limy cliffs.]

[p. 386] "The same Ericaceae [as in Vermont bogs] are noted from Massachusetts bogs, without Rh[odendron] Rhodora, the same Sarracenia, Geum, and the following trees, shrubs and perennials:"

[Then follows a list containing the following which other explorers of Massachusetts bogs would delight to see: *Lonicera oblongifolia, Aster junceus, Senecio Robbinsii, Pyrola uliginosa* and *Valeriana septentrionalis*. This is a most interesting list but before it is accepted at its face value it should be most rigidly verified, for not one of the army of Massachusetts botanists from Menasseh Cutler to the energetic explorers of the present day have ever found any of these plants in the state. And in view of our brilliant bogs of late April and May it is astounding to be told that Rhodora does not grow in Massachusetts bogs (only one page back we are told that it does).]

[p. 387] "*Mud Pond Formation.* This formation exists in ponds and slow-flowing streams with mucky, clay bottom."

[The fourteen plants listed as typical include such extremely rare species as *Marsilia quadrifolia, Potamogeton crispus*, and *Podostemum ceratophyllum* — rare because in New England *Marsilia* is locally introduced into a few ponds only, outside the traditional Bantam Lake station; *Potamogeton crispus*, similarly, is known in New England only very locally, in brick-yard pools and adjacent waters about Cambridge, Massachusetts, where it was undoubtedly introduced from Europe (see Morong, Mem. Torr. Bot. Cl. iii. 37; Gray, *Man.* ed. 7, etc.); and *Podostemum ceratophyllum* grows, as is well expressed in the *Catalogue of Flowering Plants and Ferns of Connecticut*, "on rocks, stones and gravel in shallow running water," and is therefore a rather unsatisfactory species to represent the New England "Mud Pond Formation."]

These numerous illustrations from Harshberger's descriptions of the flora of the "Labrador District" and the "Maritime District" (including the "New Brunswick Area" and the "New England Area") of his larger "St. Lawrence-Great Lake Region," although among the most inaccurate passages, are, it is regretted, by no means all on these pages. But the present reviewer, fearing that his own twenty-five years of active field-work in these two Districts might have made him hypercritical, has gone somewhat outside the areas with which he is personally familiar in order to check the result. The

next district treated by Harshberger is the "Lake District," "the region west of Lake Champlain and the Ottawa River representing the drainage basin of the Great Lakes," and its first subdivision is the "Interlacustrine Area....the country immediately surrounding the Great Lakes and other glacial lakes west of the Ottawa River" (from which it is inferred that the author classes the Great Lakes as "glacial lakes") Certainly the flora of the Great Lake country ought to be so well known that no serious stumbling is possible. But when we read the first page of discussion we find an even more surprising inaccuracy than in the treatment of the more easterly areas.

In 1868, in one of his discussions of the Canadian flora, Dr. A. T. Drummond, comparing the plants of Quebec and Ontario as a unit (Canada of that day) with the northern United States as a unit, said: "Common to Ontario and Quebec [as a unit] on the one hand, and to the Northern United States on the other, there are no less than 1,591 flowering and filicoid plants.....There are....eighty-five species which are without representatives across the border. Of these, however, it should be specially observed nineteen are manifestly introduced and there are therefore only sixty-six indigenous plants which, as between the two provinces [as a unit] and the Northern States, are peculiar to the former." The striking feature about Drummond's list was that it consisted chiefly of plants known only from cold sea-cliffs or mountain summits of Gaspé, Anticosti, the Mingan Islands or the Straits of Belle Isle or from the shores of Hudson Bay, areas which for the most part belong in Harshberger's "Sub-Arctic Forest Region," "Labrador District" and "Hudson-Bay-Keewatin District." But Harshberger, seizing upon Drummond's list of sea-cliff and alpine plants which had been found (or were supposed by Drummond to have been found) somewhere in Quebec or Ontario, reproduces it under his "Forest Formations" of the "Interlacustrine Area" as a list of the forest species of the Great Lake region!

[p. 391] "In the north and northwest [regions of Ontario] the species are identic with those found in Quebec....Common to Ontario and Quebec are eighty-five species not found south of the Interlacustrine Area. The indigenous species include the following:"

[Then follows Drummond's list of plants (with interpolations which hardly increase its accuracy), a list of plants which actually *do not grow* within hundreds of miles of the "Interlacustrine Area," and for the most part are not found in both Ontario and Quebec. The list is too long for reproduction here. However, the fact that it is anything but representative of the forests of the Great Lake region is sufficiently evident from a few examples.]

"Anemone narcissiflora L."

[A species of the Alaskan region, following the Rocky Mountains very locally to Colorado; not found in either Ontario or Quebec (see Macoun, *Cat. Can. Pl.*; Gray, *Syn. Fl.*; etc.). In some of the earlier publications (for example, Reeks, *Flowering Plants & Ferns of Newfoundland*) it was reported

from the Gulf of St. Lawrence where *A. parviflora* was mistaken for it. In fact, on p. 192, Harshberger himself (by the use of symbols) states that *A. narcissiflora* does not occur in eastern North America.]

"Thalictrum alpinum L."

[Known from Arctic Alaska, thence south on the mountains to California, Nevada, and Utah; also in easternmost Quebec on cliffs about the Gulf of St. Lawrence. Quite unknown from Ontario.]

"Ranunculus affinis R. Br. (= R. pedatifidus J. E. Smith)."

[Surely not *R. pedatifidus*. The plant of eastern Quebec which long passed as *R. affinis* is *R. Allenii* Robinson (see RHODORA, vii. 219–222), a species known only from Labrador and the highest mountains of eastern Quebec; not from Ontario].

"Vesicaria arctica Rich. (= Lesquerella arctica DC. [i. e. Watson])."

[*Lesquerella arctica* is known from Greenland and the Arctic coast of America, extending slightly southward on the outer coast of Labrador. It is entirely unknown in either Ontario or Quebec, but on Anticosti Island is represented by var. *Purshii* Watson, the plant Drummond undoubtedly had in mind.]

"Cochlearia tradactylites Banks."

[Another arctic species, unknown south of Labrador, but formerly confused with *C. anglica* of the sea-cliffs of Anticosti and the Straits of Belle Isle.]

"Cassiope (Andromeda) tetragona L. [i. e. (L.) Don]."

[Another arctic type, extending south to northern Labrador and along the mountains to Oregon, but unknown in either Ontario or Quebec.]

[p. 392] "Dryas octopetala L."

[Known in America only from Arctic Alaska south along the northern Rocky Mountains, but formerly not distinguished from the very different *D. integrifolia* of Anticosti, the Gaspé Peninsula, Newfoundland, Labrador, and Greenland. *D. octopetala* is quite unknown from eastern America.]

"Dryas Drummondii Rich."

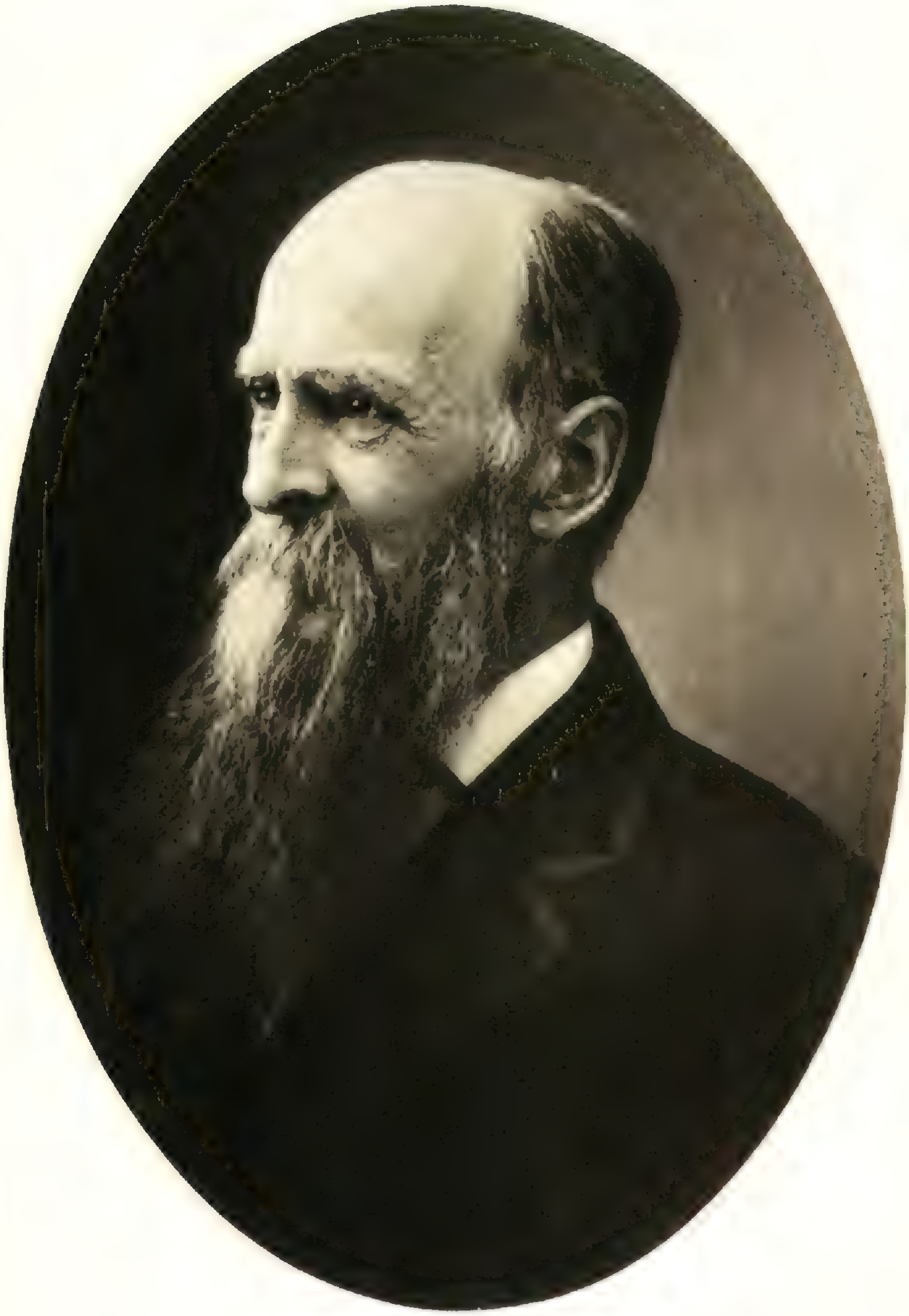
[This unique species is abundant throughout the region of the Canadian Rocky Mountains, extending south into Montana; also on the limy river-gravels of Anticosti Island and the Gaspé Peninsula, Quebec; and it has been reported from Slate Island, Lake Superior (see Macoun, *Cat.*). This distribution, however, does not make it a characteristic woodland plant of the "Interlacustrine Area." In fact, on page 190 we are informed that *Dryas Drummondii* is "found on the Rocky Mountains and the GASPÉ PENINSULA," on p. 191 (the opposite page) that it is endemic in the Rocky Mountains, and on p. 392 it is made a woodland species "common to Ontario and Quebec."]

These are a sufficient indication of the arctic-alpine plants which Harshberger considers to be common to the forest formation of Ontario and Quebec,— a list which could have been used in such a connection only through lack of familiarity with the "Interlacustrine Area" and its flora.

Similar divisions of North America into zones, sections, regions, districts, areas, formations, etc., occupy the greater part of the volume, and, though the reviewer would like to believe that the regions with which he is personally unfamiliar are better treated than the North-east, it is feared that only when the treatment is taken unaltered from the writings of some painstaking student will it prove to be anything but inaccurate. And what can be the character of the "consideration" and statistics based upon such variegated data? Obviously, the less said the better. But the greatest pity is, that to the Old World botanist who is unfamiliar with North America and to the American botanist whose primary work is in other lines the book is apt to be judged, not by its disheartening array of inaccuracies and blunders, but by the fact that it is one of the volumes of Engler and Drude's series, *Die Vegetation der Erde*; and any conclusions which may be innocently based by the unwary upon this "Survey" will always be open to doubt.

Vol. 13, no. 153, including pages 189 to 208 and plate 92, was issued 1 September, 1911.

Oenothera Tracyi, sp. nov.



Yours faithfully,
C. G. Pringle.

Rhodora

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CYRUS GUERNSEY PRINGLE.

Ezra Brainerd.

(With portrait.)

In the death of Cyrus Guernsey Pringle, on the 25th of last May, botanical Science lost a collector whose record is unrivalled. We may safely estimate that in his thirty-five years of field work he distributed to the various herbaria of the world over 500,000 specimens, embracing some 20,000 species, about 12 per cent of which were new to science. And his work was superior in quality as well as in quantity, his specimens being carefully and judiciously selected, and always neatly prepared. His dried plants have been often held up as models for young collectors, and largely through his good example the quality of herbarium material has been everywhere greatly improved during the last thirty years.

Mr. Pringle[1] was born in East Charlotte, Vermont, May 6, 1838. On his father's side his ancestry was Scotch Presbyterian; his maternal grandfather, Asa Harris, was of Puritan stock. Cyrus G. Pringle was bred to the simple but intellectual life of the old New England farmer; he was well schooled at Hinesburg, Vermont, and at Stanbridge, Quebec, and nearly ready for college, when the death of an older brother compelled him to aid his widowed mother in the management of the farm.

In early manhood Mr. Pringle became deeply interested in the religious and ethical doctrines of the Friends, of whom there were

[1] This surname is written 'Prindle' by members of the family now living. Mr. C. G. Pringle claimed to be restoring the ancestral form of the name.

many devoted disciples in that part of Vermont. Their emphasis on the supremacy of conscience, and their uncompromising opposition to war and all personal violence toward a fellow man found a congenial soil in the natural temperament of Mr. Pringle, and he joined the Society of Friends. This action is perhaps to be associated with his interest in a young woman, who taught school in his neighborhood and was a talented speaker in the meetings of the Friends. To this lady, Almira L. Greene of Starksboro, Vermont, he was married February 25, 1863.

On the 13th of July following, Mr. Pringle and two other Quakers of Charlotte were drafted for service in the Civil War. He refused to permit his uncle, Capt. Hewett, to pay the $300 that would release him, regarding it as a selfish compromise with principle. In spite of all appeals to those in authority, the three men were carried in July to the camp for conscripts on Long Island in Boston Harbor, and three weeks later transported to Culpepper, Virginia. In both camps they were subjected to most barbarous treatment. Among Mr. Pringle's papers has been found a journal that he wrote during this terrible experience. His story fills 120 pages of commercial note-paper, and is of intense interest, not only as an episode of the Civil War, but as a psychological study. The effort was made to induce him to serve in the hospitals instead of on the field, and some leaders of the Society of Friends approved of this compromise; not so Mr. Pringle. He debated in his own soul the question for days, earnestly praying for the guidance of the Divine Spirit; he visited the hospital to see what the service would be; then he put on record his final decision: "No Friend, who is really such, desiring to keep himself clear of complicity with this system of war and to bear a perfect testimony against it, can lawfully perform service in the hospitals of the army in lieu of bearing arms."

The brutal punishments resorted to to compel the men to serve are a disgrace to our military history. The men were kept for days in the guard house with the vilest of the conscripts — thieves, gamblers, and men crazed by drink: they were forced to march with guns strapped to their backs. On October 3d Mr. Pringle was tied prone on the ground with cords about his wrists and ankles, in the form of the letter X. Thus he was left for hours, until "so weak he could hardly walk or perform any mental exertion." The corporal urged him to give up, or worse would follow; even death was threatened if he did

not submit. Mr. Pringle's only reply was "it can but give me pain to be asked or required to do anything I believe to be wrong." His tormentors were amazed that he showed so little resentment — that he "was n't the least bit ugly." With a will as unconquerable as that of Prometheus he simply endured, and was ready to endure even unto death.

When the Secretary of War learned of the case, he ordered the three incorrigibles sent to Washington. They were there treated with marked consideration. Secretary Stanton told them that only his oath of office stood in the way of his giving them a discharge; he could only parole them indefinitely. But public discussion was so heated that this had to be deferred for a few weeks, and the men were sent to Douglas hospital to do merely nominal service. Even this life with all its freedom was irksome; he "longed to be released, if it be by imprisonment;" his physical strength began to give way, and for two weeks he was most of the time confined to the bed. On the 6th of November the Commissioner of Agriculture, Isaac Newton, who had taken a deep interest in the Quaker conscripts, presented their case to President Lincoln at the White House. Moved to sympathy he exclaimed to Newton, "I want you to go and tell Stanton that it is my wish all those young men be sent home at once." A little later, while Newton at the War Department was urging the Secretary to consent to the parole, the President entered. "It is my urgent wish," said he. The Secretary yielded, the order for the parole was given, and the men started that afternoon for New York.

The journal concludes as follows: "Rising from my sick bed to undertake this journey, which lasted through the night, its fatigues overcame me; and upon my arrival in New York I was seized with delirium, from which I recovered only after many weeks, through the mercy and favor of Him who in all this trial had been our guide and strength and comfort."

In the period between 1864 and 1880 Mr. Pringle was largely engaged in the culture and breeding of plants. He had growing at one time over a hundred species and varieties of *Iris* and nearly all known species of *Lilium*. He had a hospital for diseased bulbs, that were sent him by florists to be cured by his surgery in the healthful climate of Vermont. But his most successful work was the production, through hybridization, of improved varieties of wheat, oats, grapes, and potatoes. A recent writer in Science states that "his

labors in this field have added many millions to the profits of the American farmer." [1]

The latter half of these sixteen years Mr. Pringle became more and more engaged in collecting rare native plants both for dealers at home and abroad, and for several distinguished botanists such as Davenport, Tuckerman and Gray. He thus became deeply interested in the study of the flora of Vermont. In 1876 he discovered the botanical treasures of Smugglers' Notch and re-explored the cliffs of Willoughby previously visited by Alphonso Wood. Of his joy and success in these labors he gave a delightful account in a paper before the Vermont Botanical Club in February 1897.[2] As a sample of his charming style, we quote one of the closing paragraphs:

"It were going beyond the limits of my subject to tell of extended trips made during these years to the White Mountains, to join there the Faxons, till we became as familiar with those tempest-swept heights as with our native fields; or to tell of boat journeys, and the ample fruits of such, made in three successive years to the cold fir-set shores of the Lower St. Lawrence, to the Saguenay low between its palisades of giant cliffs, and through the lone lakes and unbroken forests of the St. Francis to the St. John of northern Maine; — experiences calculated to fill one with large thoughts, to raise him above fear, and to make the modern world of conventions and fads show paltry."

But circumstances were opening the way for wider work in remoter fields. In February 1872 Mrs. Pringle separated from her husband. Only a few words need be said of this painful event in his life. The wife was zealous to engage in 'evangelistic work,' going from place to place, and persistently urged her husband to engage in the work with her. But believing that he had neither taste nor talent for it, he as persistently refused. She was, moreover, in poor health, and was persuaded that it would be better for her to live with her own mother than with her husband's mother. A formal divorce was obtained October 16, 1877, the wife receiving $2,000 alimony and the custody of their only child, now Mrs. Annie R. Wright.

In the autumn of 1880 Mr. Pringle made his first trip to the Pacific

[1] We are pleased to learn that this pioneer work of Mr. Pringle in plant-breeding is to be written up by Prof. Burns of the University of Vermont.

[2] This paper was published in full in the Bulletin of the Torrey Club **24**: 350. July 1897.

slope. He was charged with three commissions: (1) as agent for the United States Census Department, to explore the forests of that region and to collect data for the final report; (2) as botanical collector for the American Museum of Natural History, to secure wood specimens to complete the famous Jesup Collection; (3) to make general collections under the direction of Dr. Asa Gray for a better knowledge of the flora of the southwestern United States. He was permitted to secure duplicate specimens when practicable, and their sale helped to defray the expenses of the trip. The printed list of plants, offered for general distribution on his return in 1881, contained about 430 species, all but 62 from Arizona.

This general work was continued for four years, the collection for 1882 being still larger and consisting mostly of the plants of California. The summer of that year he made a long and interesting journey with mules into the mountains of Lower California to secure a specimen of the trunk of *Pinus Parryana,* a trip on which Dr. Parry was his guide and companion. In 1884 he again for a short distance crossed the Mexican borders into Sonora, and his Arizona sets of 683 species for that year have an aspect decidedly Mexican.

During all these years Dr. Gray was Mr. Pringle's ardent friend and helper. He styled him "the prince of collectors." He appreciated also his keenness of observation, in the detection of hybrids in *Quercus* and *Dentaria,* in discovering leaf-propagation in the Lake Cress (*Radicula aquatica*), in noting the presence of cleistogamous flowers in *Dalibarda repens,* the first known instance in *Rosaceae,* and in the discovery that there were two sorts of butternut trees, the one sort having *staminate* flowers two weeks earlier than pistillate, the other sort having *pistillate* flowers two weeks earlier than staminate, both sorts thus incapable of self-fertilization, but well adapted for reciprocal fertilization. Dr. Gray aided Mr. Pringle materially in securing subscriptions for his sets from European herbaria, and in advancing money for needful expenses. Mrs. Gray also loaned him sums amounting to about a thousand dollars, which after Dr. Gray's death she preferred to have him retain and use in the further prosecution of the work to which her husband had been so long devoted. Near the close of her life she asked Mr. Pringle to call, and destroyed in his presence the notes that he had given her.

Dr. Gray at first kept Mr. Pringle collecting in the arid regions north of Mexico, as the latter country was not included in his Synopti-

cal Flora of North America. But from the high peaks along its northern border the great collector had often gazed with wondering eyes upon the vast, largely unexplored region to the south. In an unfinished paper entitled, "On Mexican Trails," he wrote "It was from the mountains of Southern Arizona, the Santa Rita and other mountains, in the early months of 1881, that I first beheld Mexican territory, the rugged heights of Northern Sonora receding crest upon crest in paler and paler blue beneath the staring southern sky,— a land of mystery and of fear." At last in 1885 Dr. Gray was content with Mr. Pringle's work in the southwestern United States, and arranged for him to enter upon the botanical Conquest of Mexico — a labor to which the remaining twenty-six years of his life were zealously devoted. By special arrangement he was made botanical collector for the Gray Herbarium, and served in that capacity not only till the death of Dr. Gray in 1888, but till the death of Dr. Watson in 1892. Under the administration of Dr. Robinson, in 1893 he was by act of the Corporation appointed Collector on the botanical staff of Harvard University, and held that office till the day of his death.

Of the great work that he accomplished for the botany of Mexico we may not here speak in detail. He was held in the highest esteem by the scientific and civil authorities of that nation, and mounted sets of his collections were from year to year purchased by the government. Duplicates have gone into all the great herbaria of the world, and his name will ever be illustrious in the history of Mexican Botany.

From the beginning of his field work in botany, Mr. Pringle took great pride in his private herbarium. Into this he always put any plant of his own collecting that was especially choice or rare; and from the first, he improved opportunities to obtain from other collectors, by purchase or exchange, specimens of unrepresented species. In 1902 his herbarium contained about 50,000 specimens, filling several rooms in the old brick farm-house — his birthplace — in East Charlotte. That year it was removed to commodious fire-proof quarters in the Williams Science Hall at Burlington. Arrangements were made by which it became the property of the University of Vermont, but to be under his charge and control during the remainder of his life. In the nine years that have since passed, Mr. Pringle has labored with increasing zeal for the growth of the herbarium, securing large collections of plants from all parts of the world. During the last

year of his life he added over 20,000 specimens, and the total number is now said to be about 155,000. No nobler monument can be erected to his memory than the one he has himself built in 'The Pringle Herbarium.'

Aside from his professional career, Mr. Pringle's personal character was unusually striking and attractive. He was so retiring that many of his acquaintances failed to understand him. His diffidence and shyness seemed to grow upon him till the last, as he became more and more absorbed in his work of collecting, and in his ambition to build up a great herbarium. To Mr. C. R. Orcutt, who had travelled with him in Mexico, and in recent years wrote him for data concerning his life, he replied, "I decided that it was hardly possible for me to comply with your request. It would be too painful to write my autobiography. Shyness has become habitual with me. Besides my aversion to publicity, I am too busy to write much." His great modesty is shown in the fact, that though he collected thousands of new species, and often confidently recognized them as new, he was never disposed to publish a single species on his own authority.

Mr. Pringle always led the 'simple life,' but naturally, without affectation. Epicurean pleasures never tempted him; he was as innocent of them as a child. He had no use for tea, coffee, or alcoholic beverages. After the death of his mother he prepared his own meals, whether in Mexico or Vermont, his diet consisting chiefly of bread, milk, eggs, cheese, and fruit. His dress he chose with regard to comfort and durability, rather than with regard to fashion. But he was not lacking in esthetic taste; neatness and cleanliness he ranked among the virtues. Nothing gave him more joy than a beautiful landscape, or a plant in full bloom or in ideal fruitage. In the preparation and mounting of a botanical specimen he was as much an artist as a scientist. But the fashions and conventionalities of social life he did not understand, nor care to understand.

Mr. Pringle was an extremely conscientious man. His private journal during his three months of torture in the army reveals very clearly the working of a deeply religious mind, keenly sensitive to the claims of duty, and backed up by an indomitable will. In later life his religious sentiments were less apparent; but his sense of honor was always most delicate, and his conduct towards his fellowmen thoroughly upright and free from all guile.

But the greatest charm in Mr. Pringle's character was in his kind-

liness of heart. He was a man of strong sympathy, not simply for one in trouble, but for one on whom fortune had smiled. In doing a favor for an acquaintance he always seemed to find sincere pleasure, though he rarely said so. Mr. Orcutt writes, "Mr. Pringle carried consideration for others almost to an extreme (were this truly possible); and I have seen him select the heavier burden and give his peon servant the lighter one to carry." Scores of similar instances might be cited. During the last ten years of his life he spent thousands of dollars out of his small estate to help, now a relative, now a friend, now a former assistant in what seemed to be a serious emergency. In this he was sometimes accused of acting with too little regard for self-interest. But if he failed in worldly prudence, he lived more closely than most men to the precepts of the Sermon on the Mount. These failings, if they were failings, leaned to virtue's side. If his acts of generosity at times betrayed faults of judgment, they were faults for which his friends loved him none the less dearly.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— XII.

Unusually full and detailed information in regard to the genus Carex is in the hands of the Committee. Collections seem to have been very numerous within our areas, and there are fewer gaps in distribution than in any previous report. The list is based on the Gray Herbarium, the herbaria of the New England Botanical Club, Boston Society of Natural History, Peabody Academy of Science at Salem, and Wellesley College; also Dr. C. W. Swan's collection (now at Yale University), and the personal herbaria of C. F. Batchelder, Judge J. R. Churchill, Walter Deane, F. F. Forbes, Dr. G. G. Kennedy, C. H. Knowlton, and R. A. Ware. The files of Rhodora and the local floras covering the area have been carefully consulted for additional records. Doubtful reports have been verified, or quoted with their authority where verification has been impossible.

CYPERACEAE.

CAREX, A TO C.

C. ACUTIFORMIS Ehrh. Salt marsh by Old Colony R. R. at Savin Hill, Dorchester, from 1865 (*Wm. Boott*) to 1888 (*E. & C. E. Faxon*). Station now extinct (*J. R. Churchill*).

C. aestivalis M. A. Curtis. Lexington (*Wm. Boott*, July 2, 1876).

C. alata Torr. Moist fields, swamps and wet woods. Not reported from extreme west and south; freely distributed elsewhere in district.

C. albolutescens Schwein. Wet or dry soil; Wilmington, Stoneham, Medford, Malden, Winchester, Framingham, Needham, Westwood, Canton, Milton, Hull. The well marked form, *C. albolutescens*, var. *cumulata* Bailey, was found in Medford and Malden between July 29, 1853 and July 25, 1863, by Wm. Boott.

C. aquatilis Wahlenb. Georgetown (*Mrs. C. N. S. Horner*); Concord (*H. D. Thoreau*, Dame & Collins, Fl. Middlesex Co. 116, 1888).

C. arctata Boott. Blue Hill, Milton (*G. G. Kennedy*, May 31, 1899); woods, Purgatory Swamp, Westwood, common (*J. R. Churchill*, June 11, 1892); Bellingham (*G. G. Kennedy*, Aug. 24, 1894). "Medford (C. E. Perkins); Malden (Wm. Boott)," according to Dame & Collins, Fl. Middlesex Co. 117, 1888.

C. aurea Nutt. Boggy meadow, Bradford [Haverhill] (*J. A. Cushman*, June 10, 1908); Salem Great Pastures, swampy place between Powderhouse Lane and mill-pond, scarce (*J. Robinson*, June 17, 1879); Cambridge near Mr. Norton's, no date, "a Cambridge specimen, dedit Greene" (on label in Thomas Nuttall's handwriting), specimen in Gray Herb.

C. Bicknellii Britton. Usually in dry soil; reported from nine stations in east-central portion, doubtless throughout in suitable soil.

C. bromoides Schkuhr. Boggy woods and swamps, occasional; West Newbury, Ipswich, Stoneham, Medford, Beaver Brook Reservation, Woburn, Wellesley, Dover, Hingham.

C. BRUNNEA Thunb. North Salem, made land, a patch six or eight feet across (*J. H. Sears*, Sept. 23, 1905). An Asiatic species, specimen in Gray Herb.

C. brunnescens Poir. Open woods; Gloucester, Brookline, Framingham, Norwood, Brockton; north side of Bear Hill, Middlesex

Fells [Stoneham] according to Deane, Fl. Metrop. Park Comm. 95, 1896 (as *C. canescens* L., var. *vulgaris* Bailey).

C. bullata Schkuhr. Wet meadows and swamps; Tewksbury, Lexington, Cambridge, Sherborn, Dedham.

C. bullata Schkuhr., var. **Greenii** (Boeckl.) Fernald. Very common throughout.

C. bullata Schkuhr., var. **Greenii** (Boeckl.) Fernald × **lupulina** Muhl. Small pond, Medford woods, and dried ponds (*Wm. Boott*, July 31, 1870). Specimen in Gray Herb.

C. bullata Schkuhr, var. **Greenii** (Boeckl.) Fernald × **vesicaria** L. Charles River meadows, Dedham (*F. F. Forbes*, July 12, 1907).

C. bullata Schkuhr, var. **Greenii** (Boeckl.) Fernald × **vesicaria** L., var. **monile** (Tuckerm.) Fernald. Charles River meadows, Brookline water-works land near wells, Dedham (*F. F. Forbes*, July 12, 1907).

C. canescens L., var. **disjuncta** Fernald. Swamps and bogs, very common throughout. Forms transitional between this and the type have been collected by K. M. Wiegand in Natick, Needham, and Purgatory Swamp (Westwood).

C. canescens L., var. **subloliacea** Laestad. Cambridge, Niles swamp near Fresh Pond (*W. Deane*, June 27, 1898); Needham swamp in shade, wet woods at north end (*K. M. Wiegand*, June 15, 1908).

C. CARYOPHYLLEA Lat. Dry fields and pastures, occasionally in woods; Ipswich and Salem (found by Dr. Charles Pickering before 1824, according to Wm. Oakes), West Roxbury, Dedham, Westwood, Purgatory Swamp (Westwood); Swampscott, according to J. Robinson, Fl. Essex Co. 121, 1880.

C. cephaloidea Dewey. Charlestown, ex herb. Chester Dewey, no date. Specimen in Gray Herb.

C. cephalophora Muhl. Dry fields and woods; evidently common throughout, but not reported from southeastern section.

C. communis Bailey. Dry open woods; numerous stations in central portion of the district.

C. comosa Boott. Bogs and wet places, common throughout.

C. conoidea Schkuhr. Moist grassland, common.

C. Crawfordii Fernald. Andover (*A. S. Pease*, July 10, 1904); Revere and Malden (*H. A. Young*, June 21, 1879).

C. crinita Lam. Swamps and wet places, common.

C. crinita Lam., var. **gynandra** (Schwein.) Schwein. & Torr. Slightly less frequent than the typical form.

C. crinita Lam., var. **minor** Boott. Merrimac River, Dracut (*C. W. Swan*, July 20, 1882); Ayer (*W. H. Manning*, Aug. 13, 1882).

C. cristata Schwein. Boston, off Brookline Ave., large colony at this place, growing in sandy soil, filled ground (*F. F. Forbes*, July 14, 1907); Framingham, border of swamp by road, but on dry ground, a few plants (*F. F. Forbes*, July 16, 1904).

C. H. KNOWLTON
J. A. CUSHMAN
WALTER DEANE
A. K. HARRISON
} *Committee on Local Flora.*

A PUBESCENT VARIETY OF VACCINIUM VACILLANS.

M. L. FERNALD.

MR. GEORGE L. KIRK has recently sent from Rutland, Vermont, specimens of a *Vaccinium* which has all the characteristics of the common *V. vacillans* Kalm except that its mature leaves and twigs are pubescent. In the words of Mr. Kirk: "The blueberry I find on a dry sandy hillside, growing near ledges with typical *Vaccinium vacillans* and differing from it in the slight pubescence of the under side of the leaves. It occurs only in small quantities while the ordinary species of blueberries grow in abundance in favorable localities on different parts of the same hill." Typical *V. vacillans* has the twigs and foliage quite glabrous and the pubescent extreme of the species has more than once caused some questioning among those who know it. In 1870 the same variation was collected at Rolla, Missouri, and upon the specimen sent to Dr. Gray, the collector commented: "Most like *V. vacillans* but leaves . . . .*pubescent* beneath." Others have collected the plant, and we now know it from a wide range of territory. As a variety it seems well marked and is parallel to *V. pennsylvanicum*, var. *myrtilloides* (Michx.) Fernald discussed in 1908 (RHODORA, x. 147). This extreme variation of *V. vacillans* may be called

Vaccinium vacillans, var. **crinitum**, n. var., foliis subtus ramulisque pilosis.— Vermont: in dry sand, Rutland, June 15, 1910, *G. L. Kirk* (type, in Gray Herb.). New York: Niagara Falls, *Wm. Rhoades.* Ontario: east of Leamington, May 31, 1901, *J. Macoun*, no. 54,230. Virginia: Isle of Wight County, near Franklin, June, 1893, *A. A. Heller*, no. 993; near Luray, alt. 3000 ft., August 10, 1901, *Mr. & Mrs. E. S. Steele*, no. 66. Tennessee: Lookout Mountain, April 19, 1906, *J. R. Churchill.* Missouri: Rolla, August, 1870, collector unknown; rocky hills, St. Louis County, May, June, 1879, *H. Eggert.*

Gray Herbarium.

A Comment on the Use of the Term Labrador in Natural History.— Professor M. L. Fernald in his most valuable paper in the July Rhodora says on page 120 that for the sake of "clearness of record" he restricts the term "Labrador" to the narrow eastern coastal strip belonging to Newfoundland. As the term "Labrador" is so often used for the whole Labrador Peninsula — a distinct geographical region east and north of a line drawn from the foot of James Bay to a point where the 50th parallel strikes the coast — it seems to me of the utmost importance for the sake of "clearness of record" that the term "Newfoundland Labrador" should be used where the eastern coastal strip alone is referred to. "Ungava Labrador" and "Canadian Labrador" are also perfectly distinctive terms. The term just given for the last named region in the Labrador Peninsula is to be preferred to "Saguenay County, Quebec," for that County extends some distance to the south of the boundary of the Labrador Peninsula, and Professor Fernald admits that the County is too large for the ready localization of a given point.

It is to be noted that zoologists generally include the whole peninsula when they speak of Labrador. For example in Dr. Grenfell's book on Labrador the lists of mammals, of birds, of mollusks, of crustacea and of insects all include the whole peninsula. The map of the whole peninsula in this book is labelled in the list of illustrations "Map of Labrador," while the eastern coastal strip is labelled on the map itself "Dependency of Newfoundland." It is to be remembered that Audubon's famous trip to Labrador was entirely outside of Newfoundland Labrador, and that the "Lure of the Labrador Wild" that brought poor Hubbard to his death was in the Ungava district.

To many, therefore, the term "Labrador" means the whole of the peninsula, so for the sake of clearness of record and the avoidance of ambiguity, I hope that botanists will not insist on restricting the name "Labrador" to that small part of the peninsula that belongs to Newfoundland.— Charles W. Townsend, M. D., Boston.

An Addition to the Description of Streptopus longipes Fernald.— During the season of 1911, in the course of work on the biological survey of Michigan in Cheboygan County, excellent opportunity was presented for studying the status of *Streptopus roseus* and *Streptopus longipes*. *Streptopus amplexifolius* was present in the region but there was never any question of its specific identity. It was a characteristic species of the cedar (*Thuja occidentalis*) bogs. In the case of the plants growing in the hardwood association, one was very often at a loss to determine whether the individual was *S. roseus* or *S. longipes* by the rootstock characters of delimitation. The length, thickness, branching and abundance of roots varied to both extremes with the variation in the character of the soil from good hardwood land to pine land soil. For a while it was doubted whether there were two distinct species or only one. Fructification settled the doubt conclusively in favor of two species. *Streptopus amplexifolius* and *Streptopus roseus* have more or less globose fruit which is circular in cross-section, while the fruit of *Streptopus longipes*, though subglobose in general shape is triangular in cross-section with very obtuse angles.

Accordingly *Streptopus longipes* has demonstrated its specific validity and to its description should be added the words: fruit subglobose, trigonous in cross-section with obtuse angles.— Frank C. Gates, University of Michigan.

The sixteenth annual meeting of the Vermont Botanical Club was held July 6 and 7, 1911, in conjunction with the Vermont Bird Club with headquarters at Brandon.

The first day's trip was to Mt. Horrid in Rochester. On the way the yellow bedstraw, *Galium verum*, *Stellaria uliginosa* and the balm of Gilead, *Populus candicans* were collected. Those who climbed the mountain were rewarded by seeing the rare roseroot, *Sedum roseum*,

in the only known station in the state. Other rare plants growing there are *Woodsia glabella, Polystichum Braunii, Carex scirpoidea, Saxifraga Aizoon,* three-toothed cinquefoil, *Potentilla tridentata, Juncus trifidus, Solidago Randii* and *S. Cutleri, Betula alba* var. *cordifolia* and a mountain ash with characters of both *Pyrus americana* and *P. sitchensis.* The business meeting was held in the evening at the Brandon Inn and twelve new members were elected.

The second day was spent in a drive to Silver Lake and back by Lake Dunmore. Near the former lake the road ran through a beautiful glen full of fine specimens of Goldie's fern, *Aspidium Goldianum* with a little *Asplenium angustifolium,* and in other woods near by was a profusion of *Corallorrhiza maculata.* Lunch was eaten on top of a mountain between the two lakes, from which, although it was of no great height, a splendid view of the Adirondacks and Lake Champlain was obtained. Silver Lake lies one hundred feet higher than Lake Dunmore and the stream that connects the two comes down in a series of cascades and the beautiful Llana Falls, which were visited.

About thirty-five members of both clubs were in attendance and although the weather was very hot the meeting was a successful and enjoyable one, and thanks are due to Mr. D. L. Dutton, the local member of the committee, who did so much to make it a success.— Nellie F. Flynn, Burlington, Vermont.

NOTES ON THE GENUS CIRSIUM.

B. L. Robinson.

In the nearly related genera *Cirsium, Cnicus,* and *Carduus,* groups which have been subjected by various authors to widely different limitation, the specific nomenclature has naturally become much involved. In attempting to reorganize the material of these genera in the Gray Herbarium and to bring the naming into harmony with recent ideas of classification and nomenclature, I note with regret that an unfortunate error was made in the seventh edition of Gray's Manual (p. 857). Our Atlantic American yellow thistle appears there under the name *Cirsium spinosissimum* (Walt.) Scop., a binomial of mixed authority and not applicable to the plant in question. Just how this slip occurred cannot now be ascertained. It may be said in

extenuation that during the rather brief interval between the publication of the International Rules of Nomenclature in 1906 and the beginning of presswork on the Manual in 1907 it was necessary for the editors to re-examine some thousands of botanical names, already in the manuscript, and to revise them in accordance with a new series of rules. It is therefore not remarkable that in a group where synonymy is especially complicated *Carduus spinosissimus* Walt. was confused with the specific homonym *Cirsium spinosissimum* Scop. Had time permitted a more careful study of the literature involved, it would have been evident that *Cirsium spinosissimum* Scop. was founded upon *Cnicus spinosissimus* L., a distinct species of central Europe.

There being this valid and earlier specific homonym, *Cirsium spinosissimum* (L.) Scop. Fl. Carn. ed. 2, ii. 129 (1772), it is clear that the specific name used by Walter in his *Carduus spinosissimus* (1788) cannot be revived to replace *Cirsium horridulum* Michx. Fl. Bor. Am. ii. 90 (1803). Our common yellow-flowered thistle should therefore be called, as formerly, *Cirsium horridulum* Michx., a fact duly recognized by the recent *Cirsium* specialist Petrak, Bot. Tidsk. xxxi. 58 (1911).

It is hoped that users of the Manual will note this correction, so that the unfortunate error may not lead to further confusion.

As the name *Carduus spinosissimus* Walt. has of late been pretty generally adopted by those who employ the American rules of nomenclature, it may be worth while to call attention to the fact that this name seems to be invalidated under the Madison amendments of the Rochester Code, since there is clearly an earlier congeneric homonym in *Cnicus spinosissimus* L. I am not sure whether these Madison amendments are now considered valid, but in any event I fail to see how *Carduus spinosissimus* Walt. can be employed in the same work with *Chrysopsis pilosa* (Walt.) Britton and *Chrysopsis Nuttallii* Britton,— names illustrating a parallel case inversely treated.

While speaking of the genus *Cirsium* I may here record the following transfers, which it has seemed necessary to employ in the rearrangement and labelling of material in the Gray Herbarium.

Cirsium americanum (Gray), comb. nov. *Echenais carlinoides*, var. *nutans* Gray, Proc. Acad. Philad. 1863, p. 69, not DC. *Cnicus carlinoides*, var. *americanus* Gray, Proc. Am. Acad. x. 48 (1874). *Cnicus americanus* Gray, Proc. Am. Acad. xix. 56 (1883).

Cirsium Eatoni (Gray), comb. nov. *Cirsium eriocephalum*, var. *leiocephalum* D. C. Eaton in Wats. Bot. King Exp. 196 (1871). *Cirsium foliosum* D. C. Eaton, l. c. 194 (in part), not DC. *Cirsium Drummondii* D. C. Eaton, l. c. 195 (in part), not Torr. & Gray. *Carduus leiocephalus* (D. C. Eaton) Heller, Cat. N. A. Pl. 7 (1898).

Cirsium plattense (Rydb.) Fernald in herb. *Carduus plattensis* Rydb. Contrib. U. S. Nat. Herb. iii. 167, t. 2 (1895).

ANTHYLLIS VULNERARIA AT CROMWELL, CONNECTICUT.— I am glad to record the occurrence of *Anthyllis Vulneraria* L. (Kidney Vetch) along a roadside in the town of Cromwell, Connecticut. It was first noticed on June 20, 1910, and again on June 10, 1911. The plant is decidedly rare in America and its presence in this locality is due, no doubt, to the neighborhood of the extensive greenhouses of Mr. A. N. Pierson, who is a large importer of plants and bulbs. Often at the close of the season the old potting soil is scattered on the land. There are several roots of the *Anthyllis* and it is hoped that it will continue to thrive in this locality.— FLORENCE C. HUBBARD, Cromwell, Connecticut.

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THE TYPHAE OF MARYLAND AND VIRGINIA.

Ivar Tidestrom.

In the manuals of recent dates[1] and also in the North American Flora[2] the two circumboreal species *Typha latifolia* and *T. angustifolia* are credited to our region. These are readily distinguished by their floral structures and particularly by the pollen grains — the latter having simple grains while in the former they are in tetrads. Besides, the commonly contiguous spikes in *T. latifolia* and its much broader leaves serve to distinguish it from *T. angustifolia.* In the latter the spikes are separated by an interval of from 1 to 5 cm. or more and the leaves, at least in the normal form, are only one-half as wide or about 6 mm. more or less. There are other characters which need not be mentioned, since they are given in the manuals.

In the Bracteolatae or *T. angustifolia* group there are some variants which approach *T. latifolia* in outward appearance but have the floral structure and remote spikes of the other species. Of these we find one in Maryland and Virginia.

On October 17, 1909, Dr. C. L. Alsberg and myself, while botanizing in the neighborhood of Cape Henry, came upon an area of Typha about one mile or more west of the lighthouse. At first I thought we had *T. latifolia* but upon closer examination I noticed that we had a plant before us with leaves as broad as those of *T. latifolia* and the remote spikes of the other species. I remarked to my companion that we had a new form or perhaps an old forgotten one before us. Since the variation in the size and form of our water- or marsh-plants ranges between rather wide limits, I did not wish to propose a new

[1] Britton, Man. 38, 1905. Gray's Man. 68, 1908.
[2] N. Am. Fl. 17[1]: 3–4, 1909.

form until more was known about the distribution of the plant and flowering specimens had been collected.

On August 3–4, this year, Professor A. S Hitchcock, one of his sons and myself botanized between Leonardtown and Millstone, St Mary's County, Md., and on this trip we located another area of the same form. We were able to refer the plants immediately to the Bracteolatae, although they had the appearance of *T. latifolia*. There appear to be no structural characters upon which this plant can be separated from *T. angustifolia*. The broader leaves and somewhat larger spikes can hardly merit more than formal or varietal distinction. If we should accept the views of those whom an eminent French authority has called "les pulverisateurs" or "les mihicists," then a mere difference in the aspect of a plant would compel us to erect a new species. This we cannot do conscientiously in the present case until more of the life history of the plant is known. Rafinesque described a number of species of Typha, but these will probably remain indeterminable since he gave no stable characters.

The following summary may serve in the identification of the forms growing in Maryland and Virginia:

Spikes commonly contiguous.

Typha latifolia L. Sp. Pl. 971, 1753. Kronfeld, Mon. (in Verh. Zool.-bot. Gesellsch. Wien) 176, 1889.

Plants 1.5–2.5 m. in height: leaves flat, 10–20 mm. broad, equalling or exceeding the inflorescence, spikes nearly equal in length (10–30 cm. long); the pistillate dark-brown; pistillate flowers without bracteoles; pollen grains in tetrads.

In marshes and wet places: common.

Spikes commonly remote.

Leaves about 6 mm. wide.

Typha angustifolia L. l. c. Kronfeld, l. c. 150.

Plants 1–1.5 m. in height: leaves plano-convex, exceeding the inflorescence: spikes of nearly equal length (10–30 cm. long), the interval varying from 1 to 5 cm.; the pistillate brown; flowers bracteolate.

In fresh and brackish marshes. I have observed the species in many localities in southern Maryland and on the Eastern Shore of Maryland and Virginia. Mr. McAtee has observed it at Hyattsville, near Washington.

Leaves about 10 mm. or more in width.

Typha angustifolia var. **virginica**, var. nov.

Planta robusta 2–2.5 m. alta. Folia glauca planoconvexa ca. 10 mm. lata caulibus multum longiora. Spica feminea cinnamomea 20 mm. lata 20 cm. longa, floribus bracteolata, e spica mascula 1–5 cm. distans. Pollinis granula solitaria.

In brackish marshes: near Cape Henry, Va. (Tm. 3072); with *Myrica cerifera* and *Baccharis halimifolia* in marsh near Millstone (mouth of the Patuxent River), Md. (Tm. 5141) type material.

Typha glauca Godr., which was viewed as a hybrid between *T. angustifolia* and *T. latifolia* by Kronfeld, appears to lie between the two species. He characterized it as follows: *Planta robusta, 12–15 dm. alta. Spica masc. et fem. contiguae. Axis spicae masc. pilis linearibus sordido-albis instructus. Pollen....Spica fem. castaneo-brunnea. Flores sine bracteolis; stigmata linearia pilos albos acutos superantia. Fructus....Folia caulium floriferorum laminata, glauca, laminae planae, ad 10 mm. latae, inflorescentiam superantes.*

As pointed out by Kronfeld this form has the habit and ebracteolate flowers of *T. latifolia*, and the color of the spike and form of the stigma of *T. angustifolia.* I have never observed any plant of the above description. Our variety (*virginica*) has nothing in common with *T. latifolia* except the wide leaves. These however are *plano-convex* in cross-section as in typical *T. angustifolia.*

Bureau of Plant Industry, Washington, D. C.

TWO LOST CARICES OF EASTERN MASSACHUSETTS.

M. L. Fernald.

In 1836, Dewey [1] described from near Boston two plants collected by B. D. Greene and preserved in the Torrey Herbarium, one as *Carex Greeniana* Dewey, the other taken to be *C. binervis* Smith, the latter said to be "probably introduced like *C. panicea,* from Europe; it is very like the *C. binervis* of Europe." Subsequently, it was generally stated that the plants which Dewey described were *C. helodes* Link (*C. laevigata* Smith) and *C. Hornschuchiana* Hoppe (*C. fulva* of Authors, not Good.), though, as indicated below, there has been

[1] Dewey, Am. Jour. Sci., xxx. 61 (1836).

much confusion in the exact interpretation of Dewey's types and consequently in the statements of which one is *C. helodes*, which *C. Hornschuchiana* — a perplexity to which Dewey himself contributed not a little. In 1845, in Wood's *Class Book,*[1] Dewey included both *C. binervis* and *C. Greeniana* with the statement that the latter "Resembles *C. pelva, Good.* [misprint for *C. fulva*], but differs in its fruit and glume." This statement (with *C. pelva* corrected to *C. fulva*) was repeated in subsequent issues of Wood's *Class Book* until 1861, when Dewey reversed the treatment,[2] changing to *C. fulva* Good. with the synonym "C. binervis Ed. 1," and *C. laevigata* Smith with the synonym " C. Greeniana Ed. 1" and the statement, "This and the last probably introduced from Eur."

Torrey, in his *Monograph of the North American Cyperaceae,*[3] followed Dewey's original publication; but Carey, in Gray's *Manual,*[4] taking his cue possibly from Dewey's statement in the early editions of Wood's *Class Book,* made *C. binervis* Dew., not Smith = *C. laevigata* Smith from "Massachusetts (Tewksbury? *B. D. Greene*): probably introduced"; while *C. Greeniana* Dew. was reduced to *C. fulva* and said to come from a "Pond at Tewksbury."

In the 2nd edition of the *Manual* however, Carey also reversed his treatment [5] and made *C. Greeniana* (not *C. binervis* Dew.) synonymous with *C. laevigata,* and *C. binervis* Dew. synonymous with *C. fulva*; and this understanding of the matter was followed through the three succeeding editions of the *Manual.* In his monumental *Illustrations of the Genus Carex,* Francis Boott [6] treated *C. Greeniana* Dew. as identical with *C. fulva,* and *C. binervis* Dewey as identical with *C. laevigata*; and Bailey, in his *Preliminary Synopsis of North American Carices,*[7] followed Francis Boott and the earlier statements of Dewey in Wood's *Class Book* in treating *C. Greeniana* as *C. fulva*; and in a recent paper upon Newfoundland, Professor Wiegand and the writer,[8] relying upon Boott's *Illustrations* and Bailey's *Synopsis,* spoke of *C. Greeniana* Dewey as probably a form of *C. Hornschuchiana* Hoppe (*C. fulva* Auct.). In discussing the Newfoundland and Anticosti

1 Dewey in Wood, Cl. Bk. 424 (1845).
2 Dewey in Wood, Cl. Bk. 764 (1861).
3 Torr. Ann. Lyc. Nat. Hist. N. Y. iii. 423, 424 (1836).
4 Carey in Gray, Man. 559 (1848).
5 Carey, l. c. ed. 2, 528 (1856).
6 Boott, Ill. Car. iv. 137, 163 (1867).
7 Bailey, Proc. Am. Acad. xxii. 112 (1886).
8 Fernald & Wiegand in Fernald, Rhodora, xiii, 130 (1911).

plant which we proposed as a new American variety of *C. Hornschuchiana* (var. *laurentiana* Fernald & Wiegand) we unfortunately overlooked a paper which was published by Mr. K. K. Mackenzie in 1910. In this paper Mr. Mackenzie had given a clear discussion[1] of the same plant (seen by him from Anticosti and Miquelon and identified with the Massachusetts plant of B. D. Greene which had often been called "*C. fulva*") and proposed it as a new species, *C. fulvescens*, with the suggestion that the specimen collected long ago by Greene near Boston was "possibly introduced through wild fowls from further north," and that the old report of *C. fulva* from Newfoundland arose from finding this species there.

In his discussion of *Carex fulvescens* Mackenzie points out that, in spite of the crisscross statements of Dewey, Carey, and others (including the present writer) in regard to the Greene plants, the specimen in the Torrey Herbarium "marked *Carex Greeniana* is a specimen of the European *Carex helodes* Link (*Carex laevigata* Smith) and has the long-acuminate or aristate scales of that species, in this agreeing with Dewey's description, which calls for a plant with cuspidate or mucronate scales." Thus, it may be concluded, the identity of Dewey's *C. Greeniana* is at last definitely and satisfactorily settled.

But the main object of these notes is to direct the attention of local botanists to the two plants, *C. helodes* Link (*C. laevigata* Smith) and *C. Hornschuchiana* Hoppe, var. *laurentiana* Fernald & Wiegand or *C. fulvescens* Mackenzie.[2] There is no evidence that either of these plants has been found in Massachusetts since their discovery by Greene. Whether *Carex helodes* (*C. laevigata*) was indigenous is questionable, since the species has not been found elsewhere on our side of the Atlantic. But the other plant (*C. Hornschuchiana*, var. *laurentiana* or *C. fulvescens*) which Mr. Mackenzie identifies without question with the Newfoundland, Miquelon and Anticosti plant, is strictly American and ordinarily separable by its larger perigynia and sharper scales from the Old World *C. Hornschuchiana*.

As already pointed out by the present writer[3] and as previously surmised by Mackenzie, the plant was known to Goodenough in

[1] Mackenzie, Bull. Torr. Bot. Cl. xxxvii, 239–241 (1910).

[2] Whether the plant is to be considered an American variety of *C. Hornschuchiana*, which seems to Professor Wiegand and the writer the logical treatment of it, or a distinct species, as Mr. Mackenzie interprets it, is a minor question with perfectly sound reasons for either course.

[3] Fernald, Rhodora, xiii. 130 (1911).

1794 "from *America* and *Newfoundland*." The basis for Goodenough's statement was long a mystery and we find the great Francis Boott, just before his death, still impressed with the fact, that "It is remarkable that Goodenough originally received *C. fulva* from America, and that the late Mr. B. D. Greene found it some years ago near Boston, and that no one has since met with it there or elsewhere in the States." [1] The occurrence of the plant in Newfoundland is now clearly demonstrated, and besides from there and the problematic station of B. D. Greene near Boston we know the plant also from bogs or boggy spots on Anticosti and Miquelon, but nowhere on the North American continent. That it has been found elsewhere there can be little question, since Goodenough's report of it from Newfoundland is now verified and he had also seen the plant "from *America*."

In the hope of determining with more exactness the stations where Greene had found his famous specimens the writer appealed to Dr. N. L. Britton, and in reply to these inquiries Mr. Mackenzie has kindly sent a full statement of the data found on the original sheets in the Torrey Herbarium; but unfortunately neither of the sheets indicates anything but "Boston B. D. Greene." Among Greene's own specimens at the Boston Society of Natural History Dr. J. A. Cushman has made a painstaking search and finds only one sheet: nothing to show for *C. helodes*, but a most important sheet of *C. Hornschuchiana*, var. *laurentiana*. This bears a small label through which the specimen is thrust, with the following in different inks but apparently all in Greene's hand: "C. fulva. *B. D. Greene* [followed by a space where a word is now torn out] but not limosa growing with it in pond at Tewks^y ?" and in pencil after the last word (hand unidentified): "certè." The sheet bears also two papers with notes by Francis Boott and the penciled note of Dr. C. W. Swan: "The original specimen found by B. D. Greene at Tewksbury, Mass." Boott's comments are interesting though of no importance in settling the exact station: "These 3 plants I part with as a miser does gold entrusted to him. The Georgia one I suppose to be *C. Floridana*. . . . *C. fulva & C. laevigata* we owe to you & it behoves you to find them again. I take them to be *C. Greeniana & binervis* of Torrey [by which he obviously meant Dewey]."

The statement on Greene's label, that the plant grew with *Carex*

[1] Boott, Ill. Car. iv. 138 (1867).

limosa in a pond (presumably at Tewksbury) gives an important clue, for Tewksbury was one of B. D. Greene's great collecting grounds and he made its ponds and those of Andover famous. There he collected the types of *Juncus militaris* and *Utricularia resupinata*; and on the sandy and peaty margin of Round Pond are found many isolated northern colonies of Coastal Plain species: *Sagittaria Engelmanniana, Fuirena squarrosa, Xyris Smalliana,* etc. Round Pond has therefore been much visited and always furnishes good botanizing, even at the present time occasionally giving us new records. But the other pond of Tewksbury, Long Pond, is apparently little visited by botanists because its western side is bordered by an extensive quaking bog so deep and wet as to fatigue or drive away all but the most venturesome. Here, however, is the only known station in Middlesex County for *Carex limosa*! A specimen collected by B. D. Greene himself and labeled merely "Tewksbury" is in the Gray Herbarium, but material collected by William Boott on July 8, 1863 is marked "West side of Long Pond." No other station is cited in the *Middlesex Flora,* and it is obviously in this quaking bog or in the western margin of Long Pond, that we must seek the long-lost *C. Hornschuchiana* var. *laurentiana.* On June 17 last Mr. F. F. Forbes and the writer made a first attempt at rediscovery; but we were much too early, though we found young *C. limosa* in abundance. The traveling is difficult, consisting of waist-deep wallowing and tumbling, but by mid-July, when the prize *Carex* of the bog should be sought, traveling there may prove less formidable. At any rate the search is worth making and no effort should be spared to prove whether or not the almost forgotten plant still persists at Long Pond.

In view of the established occurrence of *Carex Hornschuchiana,* var. *laurentiana* in Newfoundland and its great rarity on our continent (found only at one of the ponds in Tewksbury) it is noteworthy that Haggett's Pond in Andover (lying just to the north of Long Pond) furnishes a case of somewhat similar distribution. By all means the most generally distributed grass upon Newfoundland is *Calamagrostis Pickeringii* and, though it is found locally upon our granitic mountains, it is known as a coastwise species only from Newfoundland, Cape Breton Island, and at a restricted station near the northern end of Haggett's Pond in Andover, a famous station discovered by Mr. John Robinson in 1879. It seems probable, then, that *Carex Hornschuchiana,* var. *laurentiana* like *Calamagrostis Pickeringii,* a plant

which at present finds its great development in the Newfoundland area but retains a tenuous hold at remote points in the line of its northward migration, is to be sought in Cape Breton and upon the mountains of northern New England and northern New York.

Gray Herbarium.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— XIII.

CYPERACEAE.

CAREX, D TO K.

C. debilis Michx., var. **Rudgei** Bailey. Woods and swamps, common.

C. debilis Michx., var. **Rudgei** Bailey × **virescens** Muhl. Grove, Revere (*E. & C. E. Faxon,* June 10 to July 16, 1879–80; *H. A. Young,* June 17, 1879); Simpson Meadow, Campus, Wellesley (*K. M. Wiegand,* June 16, 1909).

C. deflexa Hornem. "Essex, Mass., ... scarce," (Gray's Manual, 6th ed. 611, 1889, under var. *Deanei* Bailey); Blue Hill, Milton (*G. G. Kennedy,* May 27, 1910 and later).

C. Deweyana Schwein. Great Pastures, Salem (*J. H. Sears,* June 26, 1881); Roxbury (*J. A. Lowell,* June, 1846); Concord (*E. S. Hoar,* specimen in herb. of, according to Dame & Collins, Fl. Middlesex Co. 120, 1888).

C. diandra Schrank. Border of salt marsh, common, Newburyport (*F. F. Forbes,* June 14, 1903); Danvers (*J. H. Sears,* 1878); Beverly (*J. Robinson,* June 17, 1879); Boxford (*E. & C. E. Faxon,* June 20, 1878); bog, Lynnfield (*M. L. Fernald,* June, 1907); shore of Mud Pond, Natick (*K. M. Wiegand,* June 10, 1908); Wigwam Pond, Dedham (*C. E. Faxon,* May 26, 1878).

C. diandra Schrank, var. **ramosa** (Boott) Fernald. In brackish marsh, Newburyport (*F. F. Forbes,* June 13, 1903); Lexington (*E. Tuckerman,* no date); "wet meadow, head of pond, Fairy Land," Concord (*H. D. Thoreau,* June 30, ——); open peat-bog, Sudbury

(*M. L. Fernald & H. M. Noyes,* June 14, 1901; *M. L. Fernald, W. P. Rich & E. F. Williams,* June 17, 1902).

C. digitalis Willd. Dry and moist woods. Not reported from northwestern and southeastern sections, but frequent elsewhere (24 stations reported).

[CAREX EBURNEA Boott. In the herbarium of the New England Botanical Club is a Carex labelled, "Carex eburnea Boott, Reading, Mass., legit W. H. Manning, July 14, 1882." Accompanying the specimen is another label with the above name in Wm. Boott's handwriting. This specimen is the authority for the record in Dame & Collins, Fl. Middlesex Co., 118, 1888, "Reading (W. H. Manning.) Rare." The specimen is not *Carex eburnea,* as it lacks the pale tubular sheaths characteristic of the species, and its identification is uncertain, especially as the perigynia are wanting. As there is a specimen of true *C. eburnea* from Vermont in the Manning Herbarium, now deposited in the herbarium of the New England Botanical Club, and as Mr. Boott would never have misnamed the Reading plant, it is plain that there has been a misplacement of specimen and label in this case.]

C. exilis Dewey. Bogs and wet meadows; nineteen stations in Essex and Middlesex counties.

Originally described in Silliman's Journal XIV, 351, 1828, Appendix to Caricography. After the original Latin description is the following note: "Flowers in May; found at Danvers, Mass., by Wm. Oakes, Esq., and is a singular and beautiful plant. It grows in small tufts, and also separate, in wet, cold meadows." On the same page Dewey describes a var. *squamacea* with the following note: "Flowers in May–June; found at Ipswich, Mass., by Mr. Oakes in dense and large tufts on the overflowed lands of Ipswich river."

C. festucacea Schkuhr. Sandy soil, filled land off Ipswich St., Boston, not abundant (*F. F. Forbes,* June 24, 1904); railroad by Charles River, Needham (*J. R. Churchill,* June 17, 1887); sandy plain near Lake Cochituate, Natick, not abundant, growing near *C. Bicknellii* with intermediates between the two (*F. F. Forbes,* June 24, 1906); dry railroad bank, Walpole (*G. G. Kennedy,* July 20, 1899); moist field, Mansfield (*J. A. Cushman,* June 1, 1908).

C. festucacea Schkuhr, var. **brevior** (Dewey) Fernald. Dry soil; many reports from central part of district, none from northern part, and only one (Norfolk) from southern part.

C. filiformis L. Bogs and wet places, common.

C. flava L. Wet places, occasional in northern section.

C. flava L., var. **elatior** Schlecht. Georgetown, Lynnfield, Malden, Cambridge, Wilmington, Lexington, Chelmsford, Concord and Dedham.

C. flava L., var. **rectirostra** Gaudin. No reports from northwest or southeast; well distributed elsewhere.

C. foenea Willd. Open woods; reports from scattered stations in central and northeastern portions.

C. foenea Willd., var. **perplexa** Bailey. Central and northeastern portions, occasional.

C. folliculata L. Swamps and wet woods; very common throughout.

C. glaucodea Tuckerm. Moist soil, south side of Blue Hill, Milton (*G. G. Kennedy,* June 14, 1901; other collections since to June 9, 1908).

C. Goodenowii J. Gay. Swamps and wet, sometimes brackish places; common throughout, especially near the coast.

C. gracillima Schwein. Deciduous woods and meadows. Not reported south of the Blue Hills, but common elsewhere.

C. gracillima Schwein., var. **humilis** Bailey. Revere (*H. A. Young,* June, 1879); Edgeworth, Malden (*Wm. Boott,* June 30, 1864).

C. Grayii Carey. Waste grounds, Cambridge (*W. Deane,* June 27, 1887). Adventive from further west.

C. grisea Wahlenb. Readville, Hyde Park (*S. T. Olney,* May 29, 1868).

C. helodes Link (*C. laevigata* Smith). Near Boston, perhaps at Tewksbury (*B. D. Greene,* prior to 1836). Not since collected and presumably a casual or adventive plant. See notes by M. L. Fernald, Rhodora, XIII, 243–248.

C. hirta L. Groves and fields; Danvers, Melrose, Medford, Newton, Ashland; Cambridge (*L. H. Bailey,* according to Dame & Collins, Fl. Middlesex Co., 115, 1888). No reports more recent than 1887.

C. hormathodes Fernald. Salt and fresh marshes and other wet places; frequent in eastern part of district, especially on the coast.

C. hormathodes Fernald, var. **invisa** (W. Boott) Fernald. Originally described by William Boott as *C. straminea* var. *invisa,* "Common on margins of ponds and in ditches in sandy soil, E.

Massachusetts. Mt. Desert, Maine." Boott's Massachusetts specimens were from Mystic Pond, Medford, "Ice Pond," Medford, and "Brookline branch R. R." The variety is apparently less common than typical *C. hormathodes.*

C. hormathodes Fernald, var. **Richii** Fernald. Frequent in central half of district, as far north as Ipswich, and south as Walpole. Named from specimens collected in Stoneham by W. P. Rich.

C. Hornschuchiana Hoppe, var. **laurentiana** Fernald & Wiegand. With *C. limosa,* western edge of Long Pond, Tewksbury (*B. D. Greene,* prior to 1836). Not since collected. See notes by M. L. Fernald, Rhodora, XIII, 243–248.

C. hystericina Muhl. Newburyport (*A. A. Eaton,* June 30, 1896); Beverly (*J. A. Lowell,* 1847); wet place, aqueduct near Benvenue St., Wellesley (*K. M. Wiegand,* July 6, 1908).

C. hystericina Muhl., var. **Cooleyi** Dewey. Fresh Pond, Cambridge (*Wm. Boott,* no date).

C. intumescens Rudge. Low ground, swamps and meadows; common throughout.

C. intumescens Rudge, var. **Fernaldii** Bailey. Wet woods, Arlington (*C. H. Knowlton,* June 22, 1907); wet place on bank of Charles River, Wellesley (*K. M. Wiegand,* Oct. 7, 1907); Heard's Pond, Wayland (*K. M. Wiegand,* July 17, 1908); wet field, south side of Blue Hill (*Wm. Boott,* July 7, 1853); rich woods on bank of Sudbury River (*A. J. Eames,* July 27, 1909).

C. H. Knowlton
J. A. Cushman
Walter Deane
A. K. Harrison
} *Committee on Local Flora.*

SALIX CALCICOLA, A LITTLE KNOWN NORTHERN WILLOW.

M. L. Fernald and K. M. Wiegand.

Salix calcicola, n. sp. *S. Richardsoni,* var. *Macouniana* Bebb, Bot. Gaz. xiv. 50, t. 9 (1889). *S. lanata,* var. *Macouniana* Bebb, according to Macoun, Ann. Rep. Geol. Surv. Can., n. s. iii. 70 J (1889), *nomen nudum.*

Since this remarkable shrub was described by Mr. Bebb from one of the Twin Islands in James Bay,[1] it has been found on calcareous cliffs of Table-top Mountain, Gaspé County, Quebec, by *Fernald & Collins* (no. 211, August 7, 1906), on the shores of Kangalaksiorvik Bay, Labrador by *Owen Bryant* (no. 75, September, 1908) at Burwell, Hudson Strait and Churchill, Hudson Bay, lat. 58° 50′ by *J. M. Macoun* (nos. 79,155 and 79,154, July 18 and August 3, 1910), and on limestone barrens at sea-level by Ingornachoix Bay and on Pointe Riche, Newfoundland, by *Fernald & Wiegand* (nos. 3151 and 3152, August 1 and 4, 1910). All this material is essentially uniform in character, agreeing with the original plate of *Salix Richardsoni,* var. *Macouniana* in its short-ovate to orbicular apiculate round-based or subcordate leaves, its dense aments and undivided stigmas. In these characters the eastern shrub is strongly contrasted with Hooker's *S. Richardsoni,* which has the narrowly obovate gradually acute leaves tapering at base, and the stigmas distinctly cleft. Besides these characters, already noted by Bebb, we find that in *S. calcicola* the midrib of the leaf is much wider and more conspicuous and the shorter petiole much broader than in *S. Richardsoni.* In the latter species, the stipules, as shown in Hooker's plate (Fl. Bor. Am. t. clxxxii) and in two authentic specimens in the Gray Herbarium, are lanceolate and bear three conspicuous gland-tipped teeth on each side. In *S. calcicola* the stipules are oblong-ovate to suborbicular, with numerous very fine glandular teeth. In all these characters the eastern shrub is so constant and distinctive that we feel no hesitation in raising it to specific rank; but since the name *Salix Macounii* has already been used in the genus it is advisable, in order to avoid possible confusion, to give the plant a new name.

Salix calcicola is quickly distinguished from all the other species known to us from eastern America by its large terminal (as well as rarely scattered) catkins and by the very large terminal hairy winter-buds which, when fully grown are 5–10 mm. in diameter. The fully mature leaves become quite glabrate and thick, varying from 2 to 5 cm. in length.

Salix lanata L. of Arctic Europe has been reported from "eastern

[1] In his account of the expedition to James Bay, Mr. James M. Macoun (Bot. Gaz. xiii. 117) says that "on the north Twin Island specimens of a new willow were collected which has been described by Mr. Bebb"; but, in the original publication of the plant, Bebb said "South Twin, James Bay, Collected July 17, 1887, by Mr. James M. Macoun, for whom it is named."

British America north of the Arctic circle and Greenland (Hook. Arc. Pl.)"[1] but Bebb remarks: "I have not seen specimens."[1] It is not improbable that Hooker's British American plant was *S. calcicola*, from which *S. lanata* is distinguished by its more elongate and pubescent leaves, its longer aments with more colored hairs, and by the 2-cleft stigmas.

Stump-healing in Pinus Strobus.— A few years ago I noticed a white pine stump which was healing over! This was contrary to all experience. For such growth is uncommon or rare on low stumps even among our dicotyledons which 'sucker up' freely. And *Pinus Strobus* never grows again from the stump,— *P. rigida* being our only conifer that behaves in this manner. The tree had been cut about four years apparently, and during this time the wound-tissue had spread inward irregularly over the cut surface, in places nearly an inch. How could a leafless plant do this? But one answer was possible,— that nourishment was being derived from some other tree, and root-grafting was suspected as the means, though such could not be proved at the time. Later a similar growth was noted on a small hemlock stump in the Arnold Arboretum. This summer another case has come to my attention, and has supplied evidence showing that root-grafting is indeed the cause of these unusual growths. One pine among a group was cut, and the stump healed slowly for two or three years before dying. These trees stand on a gravelly knoll and their roots are nearly all exposed for some distance from the trunks. Grafting frequently occurred where crossings were formed, especially along a path where the roots had been wounded. It is probable that a parasitism of this sort is not uncommon among our trees, but the sight of an apparently lifeless pine-stump magically healing itself is almost startling.— Arthur J. Eames, Cambridge, Massachusetts.

Botanical Lectures at the Lowell Institute.— The Lowell Institute announces among its courses of free public lectures a series on Local Natural History to be given under the auspices of the Boston Society of Natural History. The series upon "The Wild Plants of Eastern Massachusetts" is to be given by Professor M. L. Fernald on

[1] Bebb, Bot. Gaz. xiv. 49 (1889).

Thursdays in January at 4 P. M., in the lecture-room of the Boston Society of Natural History. The dates and subjects are as follows:—

January 4. The Indigenous Flora of Eastern Massachusetts.
January 11. Some Effects of Civilization upon our Flora.
January 18. Some Local Problems in Geographic Botany.
January 25. The Probable Geographic Origin of our Flora.

Tickets may be secured, free of charge, at the Boston Society of Natural History; at the office of the Lowell Institute, 491 Boylston St.; or by sending a request, *accompanied by an addressed, stamped envelope,* to the Curator of the Lowell Institute, 491 Boylston St., Boston.

ERRATA.

Page	76,	line	6;	for *oxycanthoides* read *oxyacanthoides.*
"	89,	"	16;	for *Thlapsi* read *Thlaspi.*
"	89,	"	17;	for *Loesellii* read *Loeselii.*
"	89,	"	27;	for *Siderites* read *Sideritis.*
"	108,	"	28;	*for* K. *read* H.
"	109,	"	12;	*for* Altantic *read* Atlantic.
"	110,	"	7;	*for* our *read* one.
"	118,	"	19;	*for* Mr. *read* Mt.
"	123,	"	22;	*for* vegatation *read* vegetation.
"	124,	"	7;	*for* voilet *read* violet.
"	130,	"	3;	for *carcina* read *caricina.*
"	132,	"	25;	*Insert* comma *after* for.
"	138,	"	27;	for *meliciodes* read *melicoides.*
"	138,	"	38;	*after* p. *insert* 131.
"	143,	"	25;	*for* are *read* is.
"	145,	"	34;	*for* note 1 *see* note 1 on page 146.
"	145,	"	37;	*insert* [1] *before* Warming.
"	146,	"	30;	*for* Anticosti,[3] *read* Anticosti,[2]
"	146,	"	33;	*for* Lawrence,[1] *read* Lawrence.[3]
"	151,	"	30;	*for* note 1 *see* note 1 on page 152.
"	165,	"	page heading;	*for* arundalana *read* arundelana.
"	186,	"	5;	for *Acrochaete* read *Acrochaetium.*
"	223,	"	18;	*for* tradactylites *read* tridactylites.

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